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Public Hearings on
NOISE ABATEMENT AND CONTROL

Vol. II—Manufacturing and Transportation Noise (Highway and Air)

Chicago, Illinois July 28-29, 1971

U.S. Environmental Protection Agency
Washington, D.C. 20460

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PREFACE

Under the Noise Pollution and Abatement Act of 1970 (title IV to the Clean Air Amendment of 1970 (Public Law 91-604)), the Environmental Protection Agency, through the Office of Noise Abatement and Control, is required to hold public hearings.

A series of eight hearings is being conducted in selected cities to aid the Office of Noise Abatement and Control in compiling information relevant to its investigation of the problem of noise pollution. Further, these hearings present an opportunity for the public and industry to express their viewpoints on the general subject of noise control. The volumes in the complete series will be:

Vol. I.—Noise in Construction.
II.—Manufacturing and Transportation Noise (Highway and Air).
III.—Urban Planning, Architectural Design; and Noise in the Home.
IV.—Standards and Measurement Methods, Legislation and Enforcement Problems.
V.—Agriculture and Recreational Use Noise.
VI.—Transportation (Rail and Other), Urban Noise Problems and Social Behavior.
VII.—Physiological and Psychological Effects.
VIII.—Technology and Economics of Noise Control; National Programs and Their Relations With State and Local.

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PUBLIC HEARING ON MANUFACTURING AND TRANSPORTATION NOISE

WEDNESDAY, JULY 28, 1971

The hearing was convened at 9 a.m., Dr. Alvin F. Meyer, Jr. (chairman), presiding, Director, Office of Noise Abatement and Control, Environmental Protection Agency.

Panel: Dr. Milton A. Whitcomb, National Academy of Science; Prof. Sheldon J. Plager, University of Illinois; Mr. Henry Martin, Society of Automotive Engineers; Mr. Lloyd Hinton, Minneapolis Metropolitan Noise Abatement Council; Prof. John Kerrebrock, Massachusetts Institute of Technology.

PROCEEDINGS

Dr. MEYER. Ladies and gentlemen, I hereby convene the public hearing on noise being held by the Environmental Protection Agency, as mandated by the U.S. Congress in Title IV. Public Law 91-604. I am Alvin F. Meyer, Jr., Director of the Office of Noise Abatement and Control of the U.S. Environmental Protection Agency.

I am accompanied and assisted today in conducting this hearing by a panel of experts representing a variety of interests. These gentlemen will serve as a hearing panel to assist us in asking appropriate questions of the invited witnesses and those members of the community who have volunteered to come forward and make a statement about noise as they see it.

Let me introduce the panel. There is Mr. Lloyd Hinton, executive director of the Metropolitan Aircraft Noise Abatement Council; Prof. John Kerrebrock, professor of aerospace technology at the Massachusetts Institute of Technology; Mr. Henry Martin, manager of resource development of the Society of Automotive Engineers; Prof. Sheldon J. Plager, professor of law at the University of Illinois; and Dr. Milton A. Whitcomb, executive director of the Committee on Hearing, Bioacoustics, and Biodynamics of the National Research Council, National Academy of Sciences in Washington, D.C.

The Administrator of the Environmental Protection Agency, Mr. William D. Ruckleshaus, has asked me to express to the panelists, to the participants, and to those who have taken time away from their daily pursuits to come to this hearing, his personal greetings, as well as the official greeting of the Agency.

Before proceeding with the hearing, let me briefly describe to you their purpose and scope and the manner in which we shall conduct them. These hearings were directed, as I mentioned in my opening remarks, by the U.S. Congress as part of an extensive effort to develop a record for the President and the Congress on the noise problem as it exists in the United States of America and what is being done about it and what can be done about it so that we may develop recommendations for further Federal action.

The scope of the hearings, despite their geographical locations in various cities around the United States, is national, although we have structured them so that regional or local interests may also be presented.

An additional purpose of the hearings is to provide information that will be useful to the administration and to the Environmental Protection Agency in implementing any legislation that the Congress may enact on the subject of noise, there being presently pending in the Congress the legislative proposal entitled the Noise Control Act of 1971.

Our fundamental approach in these hearings is to elicit facts on all sides of the issue. We come with no preconceived notions as to the most plausible solutions or the best approaches to the problem or to the nature and extent of the problem.

In this series of hearings we hope to obtain information as to all views and all approaches on all sides of the issue, so that when we arrive at the point of developing regulations, rules, standards, or whatever may be needed, they are based on a broad understanding of the issues. We are conducting these hearings in a manner similar to those conducted by the House Committee on Government Operations of the House of Representatives of the U.S. Congress. In this mode, the witnesses are invited to present their remarks; the panel will direct questions as they deem appropriate. There are no questions allowed from the floor; however, if a member of the audience has a question, he may submit it to the clerk in writing, and we will endeavor to provide an answer, time permitting.

Now, these hearings, and congressional action leading to them and to our mandate to prepare this report, are a result of a rising tide of public interest in the noise problem. And we feel that it affords a unique opportunity for the Federal Government to undertake an approach to the problems of the environment from a platform of public understanding and communication, which has not been available to us in the case of a number of the other elements of the environment. Without further ado, I would now like to begin the hearing.

We have been advised by Congressman Roman Pucinski from the 11th District of Illinois that he would be here this morning—if not, tomorrow morning. I have not heard from him regarding his plan of arrival today, so we will move to the first witness. Is Mr. Herbert W. Poston here, commissioner of the department of environmental control, the city of Chicago, Chicago, Ill. Mr. Poston, welcome to the hearing; I look forward to your testimony.

Commissioner **Poston**. I also have copies of the ordinance, and I have some copies of a little noise brochure, with a button on it, that is part of our city of Chicago program on noise.

Dr. **Meyer**. Mr. Poston, you may summarize your statement and wait for questions or read the entire statement; it's your option.

Commissioner **Poston**. I have a prepared statement, Dr. Meyer, and I would propose to read this to you.

Dr. **Meyer**: Very good, sir.

STATEMENT OF HERBERT W. POSTON

Commissioner **Poston**. My name is H. W. Poston, commissioner of the department of environmental control. Mayor Richard J. Daley has asked me to outline the city of Chicago's program to control noise for you this morning.

As early as 1957, Chicago enacted a noise ordinance which set decibel limitations for noise levels at zoning district boundaries. Chicago was the first city to establish such zoning boundary noise level limits and, in so doing, the city provided leadership and set an example for the Nation. The ordinance still serves as a model ordinance for community noise control.

The 1957 noise and vibration control ordinance covered the following types of noise, and they defined their limitations by time and distance:

1. Vocal and musical instruments, both private and commercial.
2. Steam whistles.
3. Factories using pneumatic hammers.
4. Mechanical apparatus in building or construction operations.
5. Transportation and loading of metal.
6. Boisterous behavior that disturbs the peace.
7. Motors on vehicles in excess of 5 tons.
8. Vibration-producing equipment.

This innovative ordinance answered the then existing needs of the city. As the city continued to expand and prosper, it brought with it more building construction, increased traffic volumes, and the widespread use of air conditioners and other small power equipment. The rise in activity generated increased levels of urban noise.

Realizing the need for stronger, more encompassing noise legislation, the city of Chicago conducted a noise study to evaluate its urban noise problem. This study, prepared by Bolt, Beranek & Newman, leading acoustical consultants, was followed by a series of noise hearings held by the city council's environmental control committee. All of this activity resulted in a new noise ordinance passed on March 10, 1971, which became effective July 1. A copy of the noise ordinance will be submitted with this statement. The new regulation is unique in urban noise control because it sets quantitative noise limits for many different major noise sources.

The new ordinance has retained the nuisance provisions which serve as "catchalls" for the many unusual noise sources which exist in the city. These sections include disturbing the peace, parked vehicles with engines running, use of hand organs or musical instruments or operation of steam whistles within the city.

The main thrust of the new ordinance is directed at the principal component of urban noise—motor vehicles. Several sections of the new ordinance set noise standards for various types of motor driven equipment. This section of the ordinance pertains to three types of vehicles—trucks, cars, and motorcycles. This provision forbids the sale, or offer for sale, of motor vehicle equipment exceeding the noise standards set forth. Manufacturers must certify that products meet the restrictions of the ordinance in all cases. By the beginning of 1980, all motor vehicles sold for use in the city cannot exceed 75 decibels.

While the manufacturer must meet certain requirements, operators and owners of vehicles must keep products in good working condition so they will not give off more noise than the manufacturer intended. No modifications may be made on a product to make it louder.

In operating vehicles, limits have been placed on vehicles traveling under 35 miles an hour and over 35 miles an hour. This section of the ordinance is now being enforced by two vehicle enforcement teams from the department of environmental control working in cooperation with the city of Chicago Police Department, since environmental inspectors do not have the authority to curb vehicles.

Another motor vehicle section sets limits on noise from snowmobiles, dune buggies, mini bikes, gocarts (off-the-road recreational vehicles). The limits are placed on both the sale of new equipment and the operation of the equipment in the city.

The ordinance also provides noise controls for boats operating on the rivers and lakes within the city limits. The restrictions placed on boats are 85 decibels for equipment used before January 1, 1975, and 76 decibels after January 1, 1975.

Another important category covered by the ordinance is the control of noise from construction equipment sold for use in Chicago. Construction and demolition noise is a very serious urban noise problem and a complex one to resolve. The ordinance places noise restrictions on the sale of construction equipment but not on the operation of the equipment, except for the specifications of hours of operation. The new equipment section has progressively decreased noise levels for heavy construction equipment with a noise limit goal for 80 decibels by January 1, 1980. The last category of construction equipment, that used in residential areas, has a January 1, 1978, noise goal of 65 decibels.

While decibel regulations governing noise at construction sites are not included in the new ordinance, it was felt from testimony presented during the noise hearings that additional technical information would be required to regulate the noise from construction equipment.

Realizing the lack of technical data, the department has begun a noise program to evaluate noise at construction sites. A noise survey team is collecting noise and vibration data at all major construction sites. Information related to the size, type, and duration of operation is tabulated. If a contractor is operating equipment with an unmuffled exhaust, he can be cited for disturbing the peace.

The ordinance also covers recreational vehicles or off the highway vehicles, placing noise limits on new equipment and also on the operation of the vehicles.

The ordinance forbids the use of horns or audible signal devices on motor vehicles while not in motion. With proper public education and enforcement, this problem should be greatly reduced in the near future.

Noise coming from buildings in business and commercial districts will be measured at the boundaries of the lot. This includes noise from such activities as production, processing, cleaning, servicing, testing and repair of materials, goods, or products. Noise levels from any of these functions cannot exceed 62 dB(A).

In residential areas noise from buildings will also be measured at the boundaries of the lot. Total noise levels coming from a residence cannot exceed 55 dB(A).

In districts zoned as manufacturing (light to heavy), noise from buildings is measured at district boundaries. The noise limitations range from 55 dB(A) to 61 dB(A). Where manufacturing zoning boundaries meet business and commercial zoning boundaries, the noise limit is also measured at the boundary district and ranges from 62 to 66 dB(A).

Any vibration that can be felt beyond the property line in any zoning district, whether manufacturing, business, commercial, or residential, is in violation of the ordinance. Instruments are not needed to determine the vibration.

The city's department of buildings in cooperation with the departments of public works and environmental control is currently making studies to further control noise coming from inside of all types of buildings. In the near future, these studies will be the subject of public hearings to update the existing ordinance to provide a quieter environment for citizens in their activity in all situations whether indoors or outdoors.

The department of environmental control is responsible for noise abatement and control programs for the city of Chicago. Currently our activity is divided into two separate groups from the enforcement division and the engineering division, totaling 15 people. The enforcement division has the task of enforcing all aspects of the new ordinance. The engineering division provides technical backup for the enforcement group and supplies noise engineering services to other city agencies.

The department has purchased eight sound monitoring systems for enforcing the new ordinance. Special sound measuring equipment has also been acquired for completing special noise studies around the city. This equipment is portable and mountable in a mobile sound laboratory, which is a recent department acquisition.

Although the city of Chicago has taken strong leadership in the area of urban noise control there are still many areas where we feel additional work is needed.

To provide a quieter environment, the city needs the assistance of the Federal Government. At the present time, the city is preempted by Federal regulations and is powerless to control noise from aircraft at its major airports once they leave the ground. Aircraft noise is a real source of annoyance to a large segment of our citizens who live near Midway and, particularly, O'Hare Airports.

In January of this year, Mayor Richard J. Daley wrote a letter to the Federal Aviation Administration concerning the matter. He said, in part, and I quote:

> Of special significance to urban governments is the fact that the courts have generally found that cities are preempted from regulating aircraft noise by local ordinance. Consequently, cities will be largely unable to directly regulate aircraft noise associated with the approach and takeoff of aircraft using city airports.
>
> The Federal Government has the authority and the responsibility to reduce aircraft noise, and I am requesting the Government to take immediate steps to implement its power to regulate aircraft noise and thereby provide relief to the residents of the city of Chicago and adjoining communities from the intrusion of noise generated by interstate transport.
>
> The city of Chicago strongly urges that the Department of Transportation and the Federal Aviation Administration take immediate and positive steps to exercise its authority to regulate aircraft noise and thereby provide relief to the residents of the city of Chicago and adjoining communities from such annoyance as may be generated by aircraft operations.

Surface transportation vehicles, especially those used in interstate travel, need to meet uniform regulations. The Federal Government should support efforts for implementing such standards from municipalities and States.

When Federal funds are made available for mass transit systems, the abatement of noise should be of prime importance.

In order for local governments to carry out comprehensive noise-control programs, especially those who have taken the lead, financial assistance from the Federal Government should be forthcoming.

While it is difficult for any major city to continue to control local noise sources without support in the form of legislation and additional moneys, the city is considering the following noise programs:

A noise inventory combining residential, commercial, and industrial areas in a ½-square-mile section of the city needs to be conducted by the department as a preliminary study for a citywide inventory. This information would be used to establish a baseline for evaluating the effectiveness of our noise-control program in later years in various areas.

The city plans to establish a permit system to prevent potential noise sources from being built into existing or new structures and producing noise problems, particularly in residential areas.

Chicago will continue to accept its responsibility in providing a quieter environment for its citizens. The city will continue in its pioneering efforts to control noise, but we most urgently request assistance, cooperation, and responsibility on the part of our Federal agencies in this most important task.

I asked, just before coming here, something about our complaints, and I find that in 1970 we had about 125 complaints of noise. In 1971, the first 6 months, we had 227 complaints; and in 1971, the first 2 weeks in July, we had 247 complaints on noise.

You might be interested in a statistical breakdown since July 1: Air conditioners were responsible for some 70 complaints, or 29 percent of them; trucks, about 65 complaints, 28 percent; motorcycles, 40 complaints, 17 percent of the complaints; manufacturing, 23 complaints, 9 percent; music, 20 complaints, 8 percent; children, 15 complaints, 5 percent; animal noises, 14 or 5 percent; and in this time, since July 1 we have issued 150 vehicle citations which call for court cases.

I thank you.

I have Mr. Caccavari—I must leave—and Mr. Caccavari, who is a technical expert on noise, will be available to you for your further questioning and panel discussion.

Dr. **Meyer**. Well, Mr. Poston, thank you for an illuminating discussion of what a large metropolitan community is doing. If you could stay just about 5 minutes, though, sir.

Commissioner **Poston**. All right.

Dr. **Meyer**. If you would, I would like to give the panel the opportunity to at least direct one or two questions to you. Panel on the right, any questions?

Mr. **Hinton**. I have a question, Dr. Meyer.

Mr. Poston, does the city contemplate, or has the city adopted any part of its ordinance here that you referred to as the noise——

Voice From Audience. Can't hear you.

Mr. **Hinton**. You talked about a noise ordinance adopted in 1957, establishing zoning district boundaries. Now, have you—I have two questions: One is in regard to the airport noise. Have you established any zoning in connection with O'Hare and Midway Airports?

The second question: Have you contemplated including in your city building code ordinances any criteria for exterior wall sounds insulation?

Commissioner **Poston**. I think your second question was do we have limitation for wall——

Mr. **Hinton**. No, I wouldn't characterize it as "limitation." I would suggest it was a——

Commissioner **Poston**. Standard?

Mr. **Hinton**. Standard that you have an acoustical criteria requirement for building in the exterior wall in the vicinity of high noise sources, such as an airport or freeway, or industrial district where you grant building permits. Do you also have an acoustical criteria in your building or zoning criteria?

Commissioner **Poston**. This is not in our building code. These studies that are presently underway will take this into consideration possibly when they come up for their ordinance.

Relative to the airport and zoning of the airport, we have no zoning with the exception of for runups of airplanes when they rev them up, start up; there is limitation on that.

Mr. **Hinton**. That would be a regulatory approach on the maintenance activity?

Commissioner **Poston**. Right.

Mr. **HINTON**. That would have nothing to do with the zoning of the area around there?

Commissioner **POSTON**. No.

Mr. **HINTON**. I had in mind the opening of the area contiguous to the airport.

Commissioner **POSTON**. There are none.

Mr. **HINTON**. Thank you.

Professor **PLAGER**. Mr. Poston, it appears the city is engaged in a comprehensive noise pollution, or noise abatement program. I wonder, your department, as I understand it, is responsible not only for noise, but water, air pollution, solid waste—a number of areas, all the areas of environmental control; is that correct?

Commissioner **POSTON**. Right.

Professor **PLAGER**. You indicate that your staff includes—how large is your staff, your total staff?

Commissioner **POSTON**. We have approximately 225.

Professor **PLAGER**. 225 people?

Commissioner **POSTON**. Yes.

Professor **PLAGER**. You indicate you have 15 people, totaling 15 people in the engineering and enforcement divisions regarding noise, is that correct?

Commissioner **POSTON**. Fifteen people, of which——

Professor **PLAGER**. Total?

Commissioner **POSTON**. Four are engineers.

Professor **PLAGER**. Four engineers; that leaves you 11 enforcement.

Commissioner **POSTON**. Yes; we use the engineers for enforcement as well.

Professor **PLAGER**. Do you feel that that is an adequate number of staff personnel to enforce an ordinance as broadly drafted as this one covering so many areas of noise——

Commissioner **POSTON**. Well, I think——

Professor **PLAGER**. In a city this size?

Commissioner **POSTON**. We can stand more, very decidedly, I feel that.

PROFESSOR PLAGER. How about legal enforcement? Who handles your—you mentioned you had some cases.

Commissioner **POSTON**. The corporation counsel handles the cases, court cases.

Professor **PLAGER**. This is not under your department, is it?

Commissioner **POSTON**. No, sir; that comes under the corporation counsel.

Professor **PLAGER**. How many people are assigned from the corporation counsel's office, do you know, to do this kind of work?

Commissioner **POSTON**. This is a variable figure, and we have two to three lawyers at the present time who are working on these activities.

Professor **PLAGER**. Part time, or are they full time to do this work, do you know?

Commissioner **POSTON**. Well, this comes and goes, and they are full time.

Professor **PLAGER**. Depending on their other workload?

Commissioner **POSTON**. Right.

Professor **PLAGER**. One other question, if I may, Mr. Chairman.

Dr. **MEYER**. Yes, sir, go ahead.

Professor **PLAGER**. With regard to the airport problem, you say at the present time the city, to quote your statement, the "city is preempted by Federal regulations and is powerless to control noise from aircraft at its major airports once they leave the ground."

Has the city made any attempt to regulate this problem, or to deal with this problem, or have you had an ordinance——

Commissioner **POSTON**. This was——

Professor **PLAGER**. Stricken down?

Commissioner **POSTON**. No, we have not. This has come under discussion in our environmental control committee of the city council, and from the corporation counsel in discussions with the corporation counsel.

Professor **PLAGER**. So this is purely an opinion, but you have no ordinance, no legal decision that the city of Chicago do this?

Commissioner **POSTON**. This has also been recommended by our consultants, Bolt, Beranek & Newman, who base this on their experience around the country as well.

Professor **PLAGER**. Does it matter that it's the city's own airport? Is the city powerless to do anything about airport noise from its own airport? Is that your understanding of the position?

Commissioner **POSTON**. Well, I think we can, at the time the planes, as I indicated, on runups, there are regulations on that, the time and——

Professor **PLAGER**. But beyond runups, nothing?

Commissioner **POSTON**. No.

Professor **PLAGER**. Thank you.

Dr. **WHITCOMB**. I have one very brief question. First, I am generally pleased with your ordinance; indeed, you are to be commended, you should be commended on this work. The question is also on regulation and enforcement. I am a little bit dismayed that a police officer has to work in conjunction with the enforcement people on your side——

VOICE FROM AUDIENCE. Can't hear, still can't hear you.

Dr. **WHITCOMB**. Why is it necessary to have such a potentially difficult system?

Commissioner **POSTON**: The question is why must a police officer work with our inspectors?

Dr. **WHITCOMB**. In curbing cars.

Commissioner **POSTON**. In curbing cars, and I think particularly on the expressways, this is a very hazardous operation, and we have felt that it is, from a safety standpoint that it is the most desirable way to approach this. It may be that with time, and funds permitting, we will have further training for our inspectors in this particular phase of stopping cars, pulling them over to the side, that we will get into this, but at this time we felt this was the best way to handle it. We did run a training course for our inspectors, and had about 50 people attend this course, which was a 1-week course, with a manual, and it trained them in the science of noise and noise prevention and the legal aspects, and the police department, department of public works, and other city departments, along with our own inspectors, were in this, involved in this.

Dr. **MEYER**. I have several points, Mr. Poston, I would like to make, and then we will proceed on. One is a question that has been raised about the use of the police department to enforce these regulations; this was brought up and discussed in our hearing in Atlanta, and a representative of the Atlanta Police Department pointed out to the panel there, and to me, the real problem that the police have in being required to take on enforcement, or operations of this sort. It diverts them from their primary activities, and his view was that, yes, if this was placed on them they could and would do it, but they already had so many things to do that this seemed not to be a good idea. I wonder if you, in this advanced planning that you mentioned, are going to take a look at some of the more sophisticated methods, such as those being used in Connecticut, that you may know about. I refer to a simultaneous sound recording and photograph of the vehicle, with its license, on almost an automatic basis at certain checkpoints and so on.—Apparently it is legal, according to their findings. Have you thought about taking this out of the hands of the police department?

Commissioner **POSTON**. We have looked at this and did not feel that it was, that the expenditures were justified and that they would serve our particular needs.

Dr. **MEYER**. My second question has to do with airports and airport control. In an extension of one of the other panelist's questions, did the city investigate, when it was establishing the present provisions of its ordinance, the possibility of control of the number of flights into the airport? It is operated, isn't it, by the city?

Commissioner **POSTON**. Correct.

Dr. **MEYER**. And a contract must be let by the airline, and a landing fee must be paid?

Commissioner **POSTON**. Has the question of landing fees and other means of regulation been looked into?

Commissioner **POSTON**. All of these matters were discussed——

Dr. **MEYER**. I see.

Commissioner **POSTON**. With the corporation counsel, and in the hearings of the environmental control committee of the city council.

Dr. **MEYER**. I see. Now, the last question I have is one of considerable interest to those of us concerned with future regulations, laws, and standards. You mentioned a very sharp rise in complaints received by you with regard to noise, although you have had a noise ordinance for a great number of years; to what do you attribute that sharp rise in complaints?

Commissioner **POSTON**. Well, I think the awareness of the public that we were increasing staff, and we have a new ordinance, and the media was very helpful in their articles on noise; I think all of these things had a bearing on it.

Dr. **MEYER**. Thank you very much, Mr. Poston. We appreciate your candor in answering our questions, and look forward to working with the State and the city of Chicago, from the Federal Government level. Thank you very much.

Mr. Caccavari here, would be here to enter in any other discussions that you care to enter.

Dr. **Meyer**. Thank you, Mr. Caccavari. If we need to call upon you, we shall.

Is Dr. Edward Hermann of the Department of Environmental Health and Engineering of Northwestern University here?

Dr. **Hermann**. Yes, I am here.

Dr. **Meyer**. Sir, would you please come forward and give to the clerk copies of your transcript, and if you have them available for the press, I would appreciate your giving them to the press, too.

Dr. **Hermann**. Very good.

Dr. **Meyer**. While they are getting set up here, I will apologize for the audio and visual problems that seem to plague all modern technology. We are dealing with the control of noise, and it seems as though we can't make the noise we want to at times. Dr. Hermann, glad to have you with us, sir.

Dr. **Hermann**. I am pleased to be here, Dr. Meyer.

STATEMENT OF EDWARD HERMANN, NORTHWESTERN UNIVERSITY

Dr. **Hermann**. My appearance here today is mainly that of a professor of environmental health engineering, and I wish to give some definition to the noise problem. Actually, we have concern over abatement of noise, and there are several reasons for doing this—that is, wishing to abate noise.

Some of these, I can list these in descending order of importance, you might say, and the first would be to reduce hearing loss.

The second would be to improve communications.

Third, to reduce psychoacoustical fatigue.

Fourth, attain better work efficiency.

And, fifth, to reduce the noise.

I am sure many of you are interested in various aspects, and hope to give some definition overall to noise itself, and to some of these various problems.

If I might have the first slide——

Dr. **Meyer**. Can we extinguish the television lights so the gentleman's visual presentation may be seen, please.

Dr. **Hermann**. One more and we will have it made.

[Showing of first slide in series.]

We will have to squeeze down the picture, if you have a zoom lens on that projector. No zoom lens?

Dr. **Meyer**. There we are.

Dr. **Hermann**. That's pretty good definition.

Can we cut the overhead light here?

Dr. **Meyer**. Someone, can you cut these overheads, please?

Voice From Audience. We can't find the switch, and the houseman isn't here.

Dr. **Meyer**. There he is.

Dr. **Hermann**. I will proceed while he is finding the switch.

The problem of noise is largely one of defining some of the parameters that we measure it with at which this confuses the problem to a certain extent, and we tend to define it in terms of decibels and frequency.

Frequency we call "hertz," or "cycles per second," and on this particular slide, which is familiar to most people who have delved into the acoustic field, we see that we may have the frequency spectrum plotted from about 20 to 20,000 hertz, and a minimum audible field represented by the bottom curve [indicating].

The ordinate in this case is plotted in decibels, and decibel is simply a scale often referenced to pressure ratios.

Actually, it's a logarithmic scale; it's a pure number; it is abstract, it has no absolute unit of meaning until we assign an absolute unit to the pressure variation we are talking about.

For the sake of simplicity, we can see the human thresholds of hearing as indicated by the bottom curve [indicating] occur among those who have good hearing to start with, but the lease value occurs at about 4,000 hertz. The zero reference level has commonly been used for physicists' measurements at approximately 1,000 hertz, and calling that a decibel at zero.

Now, it is not until we get up to about 120 decibels that people feel discomfort. This is on a spectral or an octave band analysis-type of arrangement, but this was obviously uncomfortable, sounds up around the 120-decibel range. When we get up to 140 to 145 decibels, sound may approach, or be into the threshold of pain for some individuals; that is a variable, both as far as being actually painful, but there is enough energy release at this level to cause a stimulation which is registered as true pain.

Now, it is between, certainly, the zero level and the 120 that we are mainly concerned with. Very few people will tolerate a painful situation; occasionally some jet mechanics may be exposed to such sound levels, but they certainly will use the protective measures that are provided to them.

It is mainly in the levels from about, say, 50 up to 120 decibels that we have our problems.

Now, in general, we see very little interference with speech communication if noise is kept under approximately 70 decibels. This is a broad-brush thing, and we have to define it more accurately as far as speech interference levels, but for our purposes we can use that particular number.

At about 85 decibels we may have some problems as far as noise, and reduced hearing loss occurs. Hearing losses may occur from a wide variety of diseases; they occur naturally from aging, and they occur from excessive noises. The excessive noise exposures that give rise to hearing losses are generally those between about 90 decibels up to 110, or even 120 in some instances.

I will elaborate on that a little bit after we take a look at this particular audiogram.

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This is an old audiogram of an individual. It is not unusual to find an audiogram of this nature showing a plot of the responses to pure tone frequencies rather than measure every frequency at 500, 1,000, 2,000, 3,000, 4,000, and 6,000 hertz.

We should notice one peculiarity of making audiometric measurements, and that is that the zero reference level is different for each pure tone that is used, and this is important, because we don't use the physicist's reference level. Instead we reference to a different level, and then call that a new zero. It is a relative measure, and we have had a change of standards over the past 2 years of using different ones.

The present one is the American National Standards Institute. This particular audiogram shows the old 1951 ASA zero reference levels. Nevertheless, this individual has some obvious hearing losses in the higher frequencies, above 2,000 hertz, but not too much loss, although some noticeable impairment below 2,000 hertz in the lower frequencies.

One thing that should be noticed, and which I will illustrate with data later on, is that it is quite easy to lose hearing due to excessive noise exposures in the high frequencies, around 4,000 hertz. It is much more difficult to force noise-induced noises on an individual, whether these are occupational, avocational, or recreational, in the lower frequencies.

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This is simply three different types of statistical distributions [indicating].

Most of the data used in noise analysis have been treated as following a gaussian distribution, and this is true for individuals with mediocre-to-poor hearing.

Actually, individuals with, if you take sets of data on individuals with quite good hearing, we find that they have a log-normal distribution rather than a gaussian distribution. I won't elaborate on that. It's not of too much immediate importance here, except for one aspect, and that is that some studies are made, were made with a young medical student a few years ago—well, actually, he had just finished graduating from medical school and wanted some research experience; it showed that among Evanston Township High School students, individuals who were screened and checked for absence of not noise-induced hearing loss, but absence of noise exposure, showed that their thresholds of hearing were truly log-normal, and not only that, but that the point at which they heard ran 28 to about 33 decibels below the zero values that were commonly used in audiological practice. This gave us some basis for absolute threshold of human hearing, and although we start measuring the ability to hear at a particular zero, it is generally near the center, or even on the high side of this curve, rather than being down where the first person in a large population starts to hear.

In other words, we said, we took a sizable population and said maybe we can let this represent the human race, rather than making the erroneous assumption that man first hears at minus infinity—which, of course, has been followed for many years. This is the same thing; these are the same data shown on a different plot showing the probability versus the—probability versus noise or sound level as given.

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Now, then, the problems that arise in noise-induced hearing loss may be classified into two regions: One would be an ideal listing scheme like this [indicating], the temporary threshold shift which may take place.

Most of you have experienced a temporary threshold shift if you have been exposed to noises on a continuous basis, say, for 6, 7 hours a day, that exceeded 90 or 95 decibels, somewhere in that range, and you have noticed, after such an exposure, that you didn't hear so well.

This may have been a blessing if you went home to your wife and you couldn't hear what she was talking about, or it may have been undesirable if she had something important to say.

However, such a temporary threshold shift recovers quite rapidly, usually, also.

Most of it, or at least 90 to 95 percent of it is recovered by the next morning, and the rest during ensuing hours, if there is no repeated exposure. But if there is another exposure the next day, as may occur in an occupational situation, and the next and the next, and this goes on day in, let's say, 5 days at a time every week, month, year, and so on, if, after years of exposure we may see an accumulative effect in that the logarithmic recovered rate as shown in blue [indicating] tends to leave a little bit of residual, of permanent threshold shift imparity. This is not new. This simply gives a nice explanation as to why, though, we may not be able to measure this effect for awhile—eventually the curve rises enough until we reach an interceptor where it is clinically demonstable [indicating].

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Looking at some data that were obtained in an oil refinery, where we conducted some fairly simple experiments of audiometrically measuring the hearing ability of some 5,000 employees, actually we put these into groups and classified them, and we simply asked the employee during their medical examination, in which audiometry was included, whether they were in a work environment where they had to stand next to a coworker, usually within about 1 foot, and shout to be understood. Well, this corresponds, roughly, to a noise field of about 95 decibels, and we found if we put them into two categories and looked at those who had, say, about 20 to 24 years of service, who claimed such a noise exposure, that we obtained a curve that looked like the yellow line shown on this particular diagram [indicating].

This was a noise, obviously true, or at least as good as you will get on most experimental data. It's hard to beat that type of fit. We then took the extreme—we had, over on the right-hand side of the curve [indicating], if we analyzed the hearing among some of our boilermakers, among the boilermakers with more than 15 years of service, and there were about 106 of them in that group, or 212 ears, we found that 4,000 hertz the measurements gave us a curve that looked like the red curve [indicating]. Obviously, we see from the right-hand side of the data, that right-hand leg, that the noise is self-limiting; that is, it did not force them into severe losses, but it did push, in the left-hand side of the curve [indicating], and made more of the individuals have poor hearing at that particular frequency—which, bear in mind, is the frequency which initially you start out with as having the most sensitive hearing, and tend to lose first.

The green curve [indicating] was among individuals who had only less than 5 years of employment in the industry, and who had no noise exposure; that is, on looking back through their medical histories there was no history of prior exposure. Their work history indicated no current exposures.

Instead of the pure tone audiogram I have shown earlier, we might use a Bekesy audiometer. That is one modified from the

Bekesy type to give the discrete frequencies, and the first three channels shown on here are time periods, which include the 500,-1,000,- and 2,000-hertz frequencies [indicating].

You can see of the first two that the 500 and 1,000 hertz ear tones test frequencies, the individuals heard, as this individual heard, quite well. This is an audiogram on a single individual, a 34-year-old boilermaker.

But then the bottom dropped out of his hearing at 4,000 hertz, where we would expect to see a notch, the notch had broadened, but in both directions, and we see that he has depressed hearing as across the board from 2,000 hertz on up. He is only 34; he had about 15 years of experience in his particular craft.

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Here are some results on a 40-year-old tube cleaner. This man was exposed primarily to low frequency noise. He hears quite well in the speech-important frequencies; he does not hear so well in the higher frequencies.

Now, it is commonly in the development of the scale of exposure that is used in the Walsh-Healy Act as far as occupational noise exposures, it is commonly felt that we can sacrifice the hearing at the origin, sacrifice the hearing in the higher frequencies as long as the lower frequencies remain intact, because the voice sounds of a human being, as far as pure tone emissions goes, that is, vocal chord emission, is from about 85 to 1,100 hertz only and with articulation, though, some of the articulation with the tongue, the throat, the mouth, and the teeth, will give us frequencies that go as high as 8,000 hertz. You can still get very good intelligence out of spoken words if you only hear from roughly 50 up to 2,000 hertz, and so the occupational exposures are sometimes quite a bit more severe than with the accepted units.

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Grading audiograms is a thing that is done—this is one of the first charts used for grading the hearing of an individual so as to simplify it, to say a seven-point scheme, A through G, and if we average the ability to hear at 500, 1,000, 2,000 hertz, and then entered the chart, we can get some characterization of how an individual hears from a simple pure tone audiogram.

This particular chart was developed around 1953 by the National Research Council Committee, now know as the Committee on Hearing and Bioacoustics, and has gone through evolutionary changes which have been adopted by both the American Medical Association, the American Academy of Opthalmology and Laryngology, and others.

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Using that particular grading scheme, if we consider the green area [indicating] in using the old 1951 ASA measurements for audiometers, we may plot, actually it's an actuarial curve rather than a probability curve, but I have used a probability scale without normalizing, it just goes from 0 to 100 percent, and showing among a control group, the left-hand curve in the sheltered years indcated that 95 percent of them had grade A hearing or heard in a normal range; about 5 percent of them had some slight hearing deficiency.

Among the boilermakers that were tested in this particular study, there were 114 of them, and in this set of data we see by the time we get down to the dividing line between A and B, approximately 25–26 percent of the boilermakers, as picked off of the curve, had hearing poorer than the levels that we would set as a beginning of impairment, and this is still used today, this low fence [indicating] is the one used in various measurement schemes for hearing.

By the time you get over to the dividing line, however, between C and D, going from mild hearing loss to serious, we see that the process is self-limited. Very few of the boilermakers were pushed over into the serious and severe range, and this might have been due to other diseases, disease situations, because this is only a statistical study, but it does show a very definite correlation with noise as the noisy occupation.

In fact, if we take the test for significance on this, the change of a condition like this, of this size, a statistical study being due to chance alone is less than the one in a million region.

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Now, another means of grading an audiogram was devised as a result of the studies made in this particular case, as done with this particular oil refinery, and we found that we could quantitate the 4,000-cycle notch which, up to that time, had been essentially a qualitative measurement for observation by audiologists.

We made a 5-point scale and subtracted the noise that would be expected in an individual due to aging alone, from the individual's hearing, and could get to 5 points on the scale. I won't elaborate on the derivation of this; the papers for all of these studies have been submitted to the chairman.

However, now we see for the same set of boilermakers that in comparison with the sheltered ears, and where the grades A, B, C—this is D right here [indicating], and that is E [indicating] region, the boilermakers show a much more severe picture. We have a much more sensitive test to use, and we see that some, oh, I think dividing line between C and D where we would first use this as a statistical test of significance, about 75 percent of the boilermakers had hearing poorer than our test would allow.

If we would get out to the, about half percentile significance level, we see that 60 percent of them had hearing poorer than the test procedure.

Now, this was quite an occupational shift, the blue area shown here [indicating].

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Among some painters—now, this is not all painters, these are painters at an oil refinery who may be working inside of a 40-foot-high tank, 120 feet in diameter, with a boilermaker shearing rivets off the outside—this gets pretty loud——

[Showing of next slide in series.]

There are the same painters on the speech average loss scheme of grading. I will go back, this was the early loss index scheme which was to be used as a more sensitive diagnostic, or we will say prognostic technique, and this was the actual pathology as far as the number [indicating], shows the number percentagewise that had lost the hearing relative to the sheltered ear, or control group.

We went through some 14 different occupations, and they scale down as shown on this table [indicating], it's the first seven we see that among some female office workers, their average age was 38—at least a birth certificate said so—and we went down from roughly 95 to 100 in what may be considered the control groups, down to 78 percent who were both in the class A, meaning that the rest were not in class A.

[Showing of next slide in series.]

And from there, going on down by categories to the boilermakers, where some 58 percent of them were in class A.

Now, this is a serious situation occupationally, in that we have a disease condition here from which you do not recover. It's not correctible by any medical or surgical technique available today, and it is measured in percent; that is, parts per hundred, not in cases per 100,000, which is how we measure most morbidity.

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This simply shows an interesting situation relative to a 54-year-old welder.

We measured his hearing, when I looked at the audiogram, that one of the technicians brought to me, I at first didn't recognize what had taken place, and after checking through his file I found out he did not have any hearing in the right ear.

What was happening here was upon conduction from the signal presented to the right side, and hearing it in the left ear, and it gave an artifact as shown here [indicating] so he was a one-eared man, essentially. He hears quite well for a one-eared man. He has some loss in the speech-important frequencies, has a pronounced loss in the higher frequencies as far as speech intelligence goes; he communicates very well, and doesn't miss words, but in a few years, or at retirement age, this man is probably going to have this spread back into the lower frequencies to a certain extent, and the prevention of this is, of course, desirable.

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We will go from occupational areas to, say, just, oh, a decibel-plotting scale that might be used in octave band analysis.

Today everything is decibel on the A scale, as an A-weighted scale; however, I tend to be a little old-fashioned, and like to stick to the octave bands analysis for accuracy. We miss quite a bit in the dBA scale despite its convenience.

This was some work developed by Jones Insurance at Esso research and engineering, and incidentally, this is one case in an industrial situation, or people out of industry were imposing and adopting criteria for their own regulation that is more severe than those being proposed today under the Walsh-Healy Act, and this is used fairly widely in the petroleum industry—at least I have seen evidence of it in companies other than those that are part of Standard Oil of New Jersey.

The maximum for communication might be given by a line such as this [indicating]; there is nothing magic about that particular line in that many people have different standards, but this is a reasonable one, and the bottom two curves are those taken from the Cook County ordinance in Illinois for permissible community noise in a business district, or in a residential district.

As you can see, at the higher frequencies—well, you can't see because of the fact that head is not quite transparent—we can see that at 4,000 and 8,000 hertz the permissible level gets down quite low as far as the amount of sound energy that is accepted in those particular octave bands.

I think I have used up my time, and I think I should stop right there and let any questioning that may develop from the panel take place.

Dr. **MEYER**. Thank you very much, professor. We appreciate getting some technical information before the group for a little bit of greater appreciation of some of the things that are going to be said later in the day about various levels of noise and their effects, and lack of effects. Panel?

Professor **KERREBROCK**. I have one question, Dr. Hermann. Your testimony seems to concentrate on biological damage, loss of hearing. Do you have additional information that you could give us, perhaps in written form, on your views of annoyance? It seems to be equally important to these hearings.

Dr. **HERMANN**. I think I should leave that to others, mainly because I do not have direct experimental evidence in that particular area. What I am saying is as a practitioner, perhaps I might be competent in that area; as a researcher I am not because I have not done this work directly myself.

Dr. **MEYER**. I would like to ask one question, which I hope will help put this information in perspective for the people who are here as observers and witnesses. Would you give some information regarding the noise or the sound level conditions to which, say, the boilermakers were exposed to in their environment that produced the hearing losses shown on the curves?

Dr. **HERMANN**. I can give some information on this.

Dr. **MEYER**. Just something rather brief.

Dr. **HERMANN**. Obviously there has been studies made in other industries on continuous noise exposures relating the noise intensities with audiometric shift or changes. That was not done in these studies. Some measurements were made, of course, but there was no good correlative evidence developed. It was mainly an occupational, as correlated by occupation.

The levels, I know that sometimes with chipping hammers, I did measure decibel intensities inside of vessels as high as 130 to 140 decibels, and there is some doubt when you get up there as to how good your measuring instrumentation is, and usually these complaints came not from the boilermaker, and these were percussive, or you might say impact sounds that are possibly not measured very well, but the complaints came from someone maybe 100, 200 feet away in another part of the shop, and the boilermaker, he would accept these. It's the old story I used to hear that, "The noise used to bother me when I started to work here, but it doesn't anymore."

Of course, he obviously lost a fair amount of hearing, so it no longer bothers him very much.

Chairman **MEYER**. Thank you very much. We appreciate your taking the time to come and give this presentation, and would like to receive from you, if you have available, some of these charts and illustrations for the record. Thank you, sir.

Dr. **HERMANN**. You are certainly welcome.

Dr. **MEYER**. We will now turn to a series of presentations regarding a problem of major interest in environmental noise; namely, noise associated with aircraft operation. We deeply appreciate Mr. Franklin Kolk of the American Airlines taking the time to come and give us a presentation with regard to certain developments in the aircraft industry concerning noise control. Mr. Kolk, would you please come forward, sir. The floor is yours, sir.

STATEMENT OF MR. FRANKLIN KOLK, AMERICAN AIRLINES

Mr. KOLK. My name is Franklin Kolk, and I am vice president of development engineering of American Airlines.

Noise has always been a burden to American cities. Nearly 200 years ago, Benjamin Franklin, a resident of peaceful colonial Philadelphia, found it necessary to move his house from High Street to Second and Sassafras because, "The din of the market increases upon me, and that, with frequent interruptions, has I find, made me say some things twice over."

The airplane has brought a new type of noise to the area near airports; a community annoyance that we recognize as serious and that we are determined to reduce in every reasonable way.

As we seek answers to the aircraft noise problem, the continued functioning and growth of the air transportation industry itself hang in the balance. Construction of several new airports is being challenged on environmental grounds, resulting in costly delays, if not outright cancellation. Long-planned, desperately needed airport expansions are being abandoned due to public and governmental pressures. Public concern about the noise from potential STOL ports—and from new STOL and long-range supersonic aircraft—has produced strong political pressure for abandonment.

Legislation passed in California—and proposed in New York, Maryland, and Connecticut—would, although primarily directed at SST's, sharply restrict—if not ban completely—all existing commercial jet aircraft from these States. The most efficient long-distance transportation system ever developed could be paralyzed, if not destroyed, were such rules allowed to stand and be enforced.

The aviation industry has failed to convince the general public either that progress has been made, or that future developments in commercial air transportation will bring significant progress towards quieter aircraft.

Each airport, each community, has its own individual problems; no curealls are in sight. We agree with FAA Administrator Shaffer that, "In the long, run, the solution to the noise problem will probably be partly technical, partly procedural, partly environmental."

The DC–10, which we will introduce into service here in mid-August, is the first commercial jetliner in airline service which meets the new sound level standards established by the Federal Aviation Administration. The DC–10 is about 15 decibels quieter than long-range B–707 or DC–8 jets, and from 4 to 10 decibels quieter than the Boeing 727. This achievement was made possible because, when the DC–10 was in the planning state, American and other airlines required noise reduction to the existing state-of-art in the design specifications to the makers of both aircraft and engines.

It is understandable why laymen would suggest retrofitting current jets with engines and acoustic treatment like those used so successfully in the DC–10. Indeed, most State and local responses to the Federal Aviation Administration's "Advanced Notice of Proposed Rulemaking on Aircraft Noise Retrofit" insist that noise retrofit be required. These responses have cited publicly available literature to prove technical feasibility and the economic reasonableness of retrofitting. Yet, the tests demonstrating technically achievable reductions relate almost entirely to approach noise only—dominated by high frequency fan noise—and applies only to certain four-engine aircraft, which account for less than a third of the free world's airline fleet.

By contrast, airline responses to the ANPRM have expressed concern over the economic implications of requiring a noise retrofit program without first determining whether the noise reductions which are believed by some to be technologically achievable are in fact, "meaningful."

In fact, there is good basis for doubt that the community would be able to perceive that "meaningful relief" had actually occurred, since tape recordings of treated versus untreated aircraft—spaced by intervals of perhaps 3 to 5 minutes—are not perceivably different, except to a trained professional. However, it seems that many public officials have somehow been convinced that such retrofit would succeed in doing so, and are insistent upon mandatory retrofitting.

No noise-reducing retrofit kits of any description whatsoever can be brought today on the market. The fact remains that the noise reductions which would be derived from a billion-dollar noise retrofit program would occur gradually over a period of about 3 years, starting 2 years from time of go-ahead. By then—1976 at the earliest—many of the aircraft would be retired or scheduled for retirement. Even if flightworthy noise-reduction kits for retrofit were now available, the airlines do not have the ability to finance the more than billion dollars they would cost.

Furthermore, there is little knowledge of the fundamental technology required to reduce the noise of one of the common jet engines powering many present short- to medium-range jet transports.

Only now is a noise-reduction program starting on the JT8D engine which powers the DC–9, 737, and 727 aircraft. Fan noise is not the major problem with these engines; their problem is relatively high velocity, and low frequency jet noise.

In any case, care must be taken to insure that the ability of existing aircraft to do their required missions is not impaired by noise reduction modifications to the point where they are unsafe or uneconomical.

In spite of today's apparent sophistication, much is still to be learned. Concerted efforts to fill the gaps in our knowledge are leading to a rapidly evolving science, both theoretically and empirically.

A case in point is the Boeing 747. Its design for low noise received a great deal of attention prior to the establishment of specific noise criteria or the promulgation of a definitive noise certification regulation. After most of its major technical design features had been frozen, new knowledge became available regarding the effects on noise of nacelle configuration, duct dimensions, and sound-suppression material absorption characteristics. Some of this new knowledge was later incorporated in redesign of the 747 powerplant installation (at considerable added development cost). However, other features—such as a major change to the nacelle configuration—could not be incorporated in the production aircraft simply because their effect was not clearly understood in time to permit its incorporation before the hardware was produced.

The 747 nonetheless represents a significant advancement in aircraft noise reduction. The 747's produce noise levels no worse on takeoff, up to 7 EPNdB less on approach, and 4 to 6 EPNdB less on the sideline, compared to other four-engine transports which are in service today. These reductions are especially noteworthy when you consider that the 747 is twice the size of the previous four-engine transports.

New knowledge, not available to the designers and builders of the 747, was available to the designers of later aircraft. This was incorporated in, and will result in somewhat quieter Douglas DC–10 and Lockheed L–1011 airline transports.

Noise reduction doesn't come easily. Noises normally produced include those propagated forward of the airplane, originating mainly from the fan and compressor states of the engine. In the aft quadrants of the engine are fan noise, turbine noise, externally generated jet exhaust noise, and noise produced by the mixing of the primary and cold fan streams. Also, noise often radiates through the engine case, and combustion noise often combines with turbine noise. Each specific noise problem must be solved by techniques that must work over a wide range of operating conditions. In addition, success in suppressing one noise source unmasks other previously unsuspected sources. This may require simultaneous suppression of several noise components. To find the best combinations of suppression materials and design techniques, you need a lot of luck as well as skill.

Noise reductions aren't cheap—not when 1 to 1½ tons of acoustic treatment goes along for the ride on every trip, nor when it costs roughly $200,000 per aircraft extra for this treatment alone.

Development of the acoustically treated Boeing 747 engine nacelle cost $105 million. The cost of the acoustic treatment for American's 16 747 aircraft was roughly $4 million. The added weight of the acoustical material on each 747 is the equivalent of 26 passengers on a trip.

Noise reduction also takes a great deal of time. Conceived in the mid-1960's, the quieter 747 was committed to production in 1966, and made its entrance into service almost 4 years later. The same elapsed time also holds for the DC–10.

Any aircraft change, such as a noise alleviation change, must be worked out to justify its specific purpose. In addition, it must satisfy the basic requirements of airworthiness and must be so justified to the proper Government agencies. This demonstration or certification process is laborious, time-consuming and often frustrating. It involves factors, in most cases, quite unrelated to the basic intent of the change. Hence, there is understandable pressure to maintain status quo in a given fleet and introduce the changes in newly procured aircraft as product improvement items, or as entirely new models.

In the noise field, we have been dealing with a very fluid, nondefinitive science. It has been difficult to measure the noise emanating from aircraft and to quantify this noise in terms of annoyance to persons on the ground. This quantification is still rather incomplete.

Secondly, there has been lack of correlation of fundamental principles with actually demonstrated engineering accomplishment. For example, at approach conditions all the new engines make more noise than they ought to according to fundamental theory. This has been most frustrating.

Thirdly, there has been only a partial understanding of the physical behavior of various noise sources. There has not been an organized volume of experiments with widely different configurations of noise sources to verify the theories that may explain the physical phenomena that are talking place.

In the area of activity pertaining to large jet-type transports, there have been several significant scientific developments over the years. The first was the mathematical definition by Lighthill, an English scientist and mathematician—of the behavior of pure jet noise emanating from the high velocity jet immediately behind the engine. His work, which has been definitely verified, postulates that the sound intensity varies as the eighth power of the jet velocity in the region of primary interest. This work was published in the early 1950's.

The second significant work was the contribution of Messrs. Tyler and Sofrin of the Pratt & Whitney Corp., in the early 1960's —a mathematically derived and experimentally verified general theory of noise generation from rotating and stationary blading elements. This equipped the industry to eventually deal with a whine of the turbofan engine.

As things stand now, we have little basic theory to go on beyond these two milestone works. Much of what has been accomplished has been done by brute force and complete empiricism.

Against this background, the first generation of jet transports was introduced and fitted with sound suppressors. The sound suppressor stemmed for the work of Greatrex in England and provided potential for marked reduction in high-velocity jet noise. As the available engines for the original 707's and DC–8's were jet engines, this technique was effective in reducing their noise patterns. In the case of the 707, by contract, Boeing was required to fit the airplane with suppressors which reduced the overall noise level by at least 11 decibels. This requirement was met, but on a subjective scale the results were only of the order of 5 or 6 decibels reduction. Even though they resulted in enormous losses of efficiency, suppressors were required by the airlines in their procurement negotiations, dating back to 1955. It has been estimated that the suppressor costs approximately $10,000 per airplane annually in increased operating expenses.

Knowledge of the working of the Lighthill formula of jet noise led in the late 1950's to the development of the so-called turbofan engine, which has a markedly reduced jet velocity compared to the straight jet engine. It was postulated that this reduced jet velocity would markedly reduce community noise. Since even in the propeller days, takeoff had been their prime noise problem, the airlines naturally were interested in jet aircraft takeoff noise. American decided to introduce the turbofan engine on a conversion basis, across the board, in order to reduce takeoff noise. This was especially important at New York's Idlewild Airport, where a transcontinental flight could not take off without creating an unacceptable level of noise.

Thus, the turbofan engine was sponsored by the airlines, and its introduction was forced by the airlines. However, while the turbofan did reduce the external jet noise, it developed an unwanted increment of fan whine due to the new large fan. As the fan whine turned out to be very annoying relative to other types of noises, it was soon recognized that action would have to be taken in this field, too. In the case of American, which had already begun converting its existing jet engines to fan engines, the condition seemed serious enough to consider halting the whole program. Pratt & Whitney embarked on a crash program to attempt to modify the fan design to reduce the apparent level of the whine. A modification—somewhat facetiously referred to as a "hush kit"—was developed and incorporated into production engines as soon as possible. American further converted over 100 engines which had been produced prior to the development of the kit. Again, the thrust behind the conversion program was airline management's recognition that all possible steps had to be taken to ameliorate the problem.

Concurrently, the industry developed, in cooperation with the FAA and many local agencies, a series of noise abatement procedures designed to direct airplanes over sparsely settled areas wherever possible and to take such steps in flying technique as would minimize the noise actually reaching the ground. This has resulted in circuitous routings in and out of airports and has considerably increased airplane operating expense through additional time in the air. It is apparent that these procedures are also responsible to a large degree for today's congestion at many airports.

American Airlines, since the early jet days, has attempted, insofar as possible, to insure that each succeeding aircraft procurement model was quieter than the one that preceded it. Hence, each of American's aircraft contracts—starting with the 727 contract—has had a detailed and specific noise guarantee section. The section has set the maximum noise limits appropriate to specific missions performed by that type of aircraft. Aircraft covered include the 727–100 series, the 727–200 series, the BAC 1–11–400, the Boeing 747, and most recently, the DC–10.

Of particular interest was American's procurement of the 727–200, or stretch series. At American's demand, its engine was equipped with a sound-absorbing treatment in its discharge duct —which I believe is the first application of large-scale sound-absorbing treatment to any engine in commercial service. The treatment itself was not very effective, since it only reduced the approach noise by approximately 3 decibels. But in combination with a somewhat higher takeoff thrust, it produced an airplane whose community noise exposure was no worse than the earlier standard short bodied, series 100 airplane.

With the advent of the turbofan engine, perhaps the key contribution to our knowledge was the Tyler and Sofrin work on fan whine in the early 1960's. This landmark effort gave designers clues to how to build quieter high bypass turbofan engines. A whole family of engines resulted from this work—the Pratt & Whitney JT9D, the General Electric CF-6, and the Rolls-Royce RB.211. All of them incorporated single stage fans with no inlet guide vanes and with maximum spacing between the rotor and the stator blades to minimize fan whine. Engines of this family power the Boeing 747, the Douglas DC-10 and the upcoming Lockheed L-1011.

It is important to note here that both private and public research rapidly escalated during the development of these airplanes and engines. But our procurement commitments for both 747 and the DC-10 were made, and the designs frozen, well before the promulgation of Federal Aviation Regulation part 36 dealing with noise limits.

The 2 years' experience gained between initiation of the 747 project and the DC-10 increased our knowledge enough for the DC-10 to meet FAR.36. Further, American Airlines procurement requirements delineating aircraft noise for use at LaGuardia Airport were the binding design criteria on the DC-10, and these requirements did in fact anticipate the Federal regulation both timewise and quantitatively.

The airlines are continuing to explore every means at their disposal to further reduce community noise. It is known that steeper flight paths reduce noise for both takeoff and especially approach. Yet, with the instrumentation currently available and installed in the aircraft, quantum increase in the angle of approach cannot be made within the constraints of necessary systems safety. American Airlines has initiated an indepth program to explore what instrumentation and flight techniques might be required to utilize steeper approaches. This work is now underway under NASA sponsorship. We have also been experimenting with the use of reduced flap settings as an operational technique for reducing approach noise. This has long been implemented on the 727 aircraft, and only recently was certified through our initiative—on all our heavier 707 aircraft. American has this year certified its 707-300 series aircraft for reduced flap settings for landing and is proceeding to implement this technique. A measurable reduction in noise level is anticipated.

Against this background, I wish to propose a comprehensive national research program for aircraft noise alleviation.

Such a program should include national goals for reducing the allowable noise levels of new aircraft gradually over time towards some reasonable objectives. A goal for the "next generation" of commerical transports should be a reduction of 10 EPNdB—referred to FAR.36 criteria—with a further objective of a 15 EPNdB total reduction. These appear supportable based on past progress and average out to between 3 to 5 EPNdB per 5 years. However, this is not a guaranteeable, automatic, continuous reduction. Technological progress cannot be rigorously programed;

"invention cannot be scheduled." Nevertheless, our improving noise technology appears capable of generating this average level of noise reduction for an aircraft of a fixed size.

Fundamentally, such a national goal should be implemented by lowering FAR.36 noise levels as frequently as noise reduction technology permits, which should average 3 to 5 EPNdB every 5 years. In specific cases, or when technological breakthroughs occur, more stringent rules or accelerated revision of the rules should be undertaken. It should be clearly understood, however, that revised rules should not be applied retroactively. They should only be applied to aircraft whose formal development commences after the establishment of the rule.

Further progress depends on our obtaining a more complete understanding of both noise generating mechanisms and the propagation and attenuation of noise in the atmosphere. Our knowledge about both is incomplete. Airlines, airplane and engine manufacturers, various technical societies, and the Federal Government are all involved in these studies. NASA alone spent $13.5 million for such research projects during fiscal 1971. Unfortunately, the required intensive research has been underway only about 4 years.

To support such a national program, we must begin additional basic research on the physics of aircraft noise generation, propagation, measurement, and control, and on the subjective aspects of human annoyance.

1. The most pressing basic research need—both in terms of understanding today's problems and guiding future research—is in the area of human response to aircraft noise. Until a more complete understanding is achieved of what type of community noise is "acceptable," judgment as to where the noise research funding should be expended will at best be speculative. The effects of high and low frequencies, pure tones, spectral shape and absolute level and rate of exposure—repetition—need to be understood in terms of their individual and combined effects on human responses. This research is needed to support current studies on the potential benefits of noise retrofit, to provide direction for advanced research projects, to provide guidance for design of future conventional, high-speed, and STOL aircraft and propulsion systems, and to determine environmental impact of the air transportation system as a whole. Current procedures, such as the Noise Exposure Forecast, are inadequate in their present form to provide the answers and guidance required. In addition research must take into account not only the social aspects of noise annoyance, but the medical ones as well. I am pleased to note that EPA will cover both subjects in depth at a later hearing.

2. Jet noise from low and high bypass ratio engines with jet velocities of 800 to 2,000 feet per second requires closer attention. NASA-supported research in fan noise suppression has been successful in obtaining reductions in fan noise of as much as 15 EPNdB at approach power where the fundamental jet noise is low. But, no reductions were found at power settings where engine noise is dominated by jet noise.

3. Current research supported by NASA on quiet fan and compressor noise if national goals are to be reached.

4. Noise suppression for high velocity jets—2,000 feet per second and greater—received significant attention under the recent U.S. SST effort. Since significant progress was made on advanced suppressor designs, the results of the U.S. testing should be formally prepared and published. It is very desirable, if not essential, that research studies be continued in this area, to support continued research in future transonic and supersonic commercial and military aircraft which will require propulsion systems with high jet exhaust velocities.

Systematic evaluation of, and experimentation with, noise measurement techniques are required for continued progress in noise reduction, estimation and evaluation. We know far too little about the effect of real atmospheric conditions on noise attenuation.

Beyond this research, we also need new public-policy attitudes. As mentioned earlier, apparently slow progress in reducing aircraft noise has led to a proliferation of antinoise legislative acts at all government levels—right on down to some of the smallest municipalities.

Some pieces of legislation have been technically sophisticated, although the economic implications of meeting them could be disastrous. Others have been extremely naive and simplistic. Yet almost without exception, no two proposed or enacted statutes have been alike. For example, the Federal Government (FAA) uses as its noise measurement and certification unit effective perceived noise decibels (EPNdB). The Port of New York Authority has been using perceived noise decibels (PNdB) for about 12 years. The State of California's recent antinoise legislation (which is to go into effect next December 1) uses the A-weighted noise scale with a duration correction time constant of 1 second. The city of Chicago recently considered—but wisely did not enact—an aircraft antinoise ordinance using a noise unit similar to California's but with a duration correction time constant of 10 seconds. The State of New York has been considering a bill which uses uncorrected dBA.

Imagine driving your automobile from California with a speed limit of 60 m.p.h., into Arizona with a speed limit of 45 knots, into New Mexico with a speed limit of 110 kilometers per hour, and on into Texas with a speed limit of 150 feet per second. None of the speed limits are comparable of course. Imagine how much more difficult it would be to try to operate an entire fleet of aircraft daily in the face of local and State noise rules using different units and measurement locations, and requiring different operating procedures.

To head off potential regulatory chaos, the airlines advocate Federal preemption of the field with respect to noise regulation. Only with one consistent set of rules—encompassing both rational and compatible criteria for design, certification and flight operations—can a safe and effective job of minimizing aircraft noise on the ground be accomplished.

Furthermore, the setting of noise standards and regulations, and their enforcement, should be the responsibility of a single regulatory agency which also has the prime responsibility for establishing flight safety and airworthiness standards. There is no logical separation of noise standards from design and operating criteria involving airworthiness and noise abatement. Thus, the regulatory agency which guides the flight safety aspects of aviation, and which already has the expertise and manpower to support aircraft noise abatement activity, should also set standards for design, operation and enforcement—if necessary—with respect to noise after due consultation with the Federal Environmental Protection Agency.

As technology becomes available, the airplane engine will become quieter, but at no point can we foresee a perfectly silent airplane engine. Airports are not going to be silent places in the foreseeable future.

As a consequence, there must be more effective zoning by appropriate authorities to inhibit noncompatible uses of property adjoining airports. Builders continue to erect homes and apartments directly under flightpaths, even though they know, or should know, that the people who live in these dwellings are going to be made uncomfortable by the noise. A prime example is the "Twin Pines Development," a State low-cost housing project slated for the Canarsie section of Brooklyn. It will place 20,000 people some 800 feet under an approach to Kennedy Airport now used heavily to divert noise from other densely populated areas of Brooklyn. Not long ago, the New York papers also announced a State housing project proposed for Floyd Bennett Field, also directly beneath heavily trafficked Kennedy Airport approach and takeoff paths. If these were isolated instances, they would be understandable or forgiveable—but they happen all too frequently, all over the country. It is difficult to understand how any government—Federal, State or local—can justify such obvious disregard to the citizens it represents and purportedly protects.

Since local zoning jurisdictions often overlap and conflict, Federal model airport zoning ordinances are needed for local consideration and implementation. This will promote truly compatible use of land around airports, including light industry; businesses functionally related to airport activity—like airline suppliers; vendors of food, maintenance and fuel; freight consolidators and handlers—soundproofed indoor recreational facilities—like bowling alleys.

The problem of environmental control must be attacked by all sectors of society; government, producers, and consumers.

Government is at fault when it subordinates real improvement to apparent improvement. Government is also at fault when it fails to enact realistic standards, or to exercise governmental restraint to protect the public against noise-wise incompatible uses of property.

The producers—the manufacturers and the airlines—are at fault if they fail or refuse to utilize existing techniques and devices to reduce noise. They are also at fault if they fail to undertake the necessary research to accomplish further improvements.

As to consumers, we believe they are prepared to pay for the added costs of environmental control. However, they are at fault if they fail to elect public officials who will carry out rational programs necessary to such control. They can also be faulted for failing to recognize a potential noise problem or to take adequate steps to protect themselves from noise problems. This is especially true of people who choose to move into housing near an airport, and subsequently complain bitterly about the noise.

Each of us bears a heavy responsibility to protect our own and future generations from burdensome noise. I hope that my statement here today will contribute positively to your splendid efforts to develop sound and fiscally sensible recommendations to the President and to the Congress. I thank you for the opportunity to participate in your program today.

Dr. **MEYER**. Mr. Kolk, I can assure you that your statement will contribute in a positive manner to the effort the Environmental Protection Agency is undertaking. I appreciate your candor, in telling it as it is, or how you see it; and before I ask a couple of questions myself, I will appreciate it if you would take the time for a few minutes and respond to questions from the panel; it may be that you may want to answer some of these for the record in writing, in which case if you do, we will make them available to the press here, of course, at the time we receive them, because this is a public hearing. I realize you are on a tight schedule.

Professor **KERREBROCK**. Your statement is very complete, and I just have one question. You propose a reduction in noise, as you say, as technology makes it feasible. I think we have to agree that there is implicit in this proposal some judgment as to how much performance should be improved as technology permits it, and how much noise should be reduced, and I gather that you more or less agree with NASA's position that 10 dB reduction from FAR.36 is conceivably possible within 10 years, but you have reservations as to how this reduction should be implemented, whether it should be by rulemaking, or by taking advantage of the technology as it offers itself.

Now, I wonder if you could give us any judgments as to whether it would be possible to implement these recommendations faster; that is, reduce noise faster if we were willing to accept somewhat larger economic penalties.

Mr. **KOLK**. I think that the process that you describe really goes something like this: You have two alternatives, you can research behind closed doors for a period of time and come up with a large amount of technical goodies, a big hunk, and then you can start out with a clean sheet of paper. You can design an engine, and you can design an airplane, and you can design a nacelle to carry the engine, and you can come up with a very, very startling step function reduction in noise in that vehicle.

Now, this is the process which we have gone through on the DC-10. The DC-10 started out on a clean sheet of paper, and it was designed specifically to bring the lowest noise that appeared to be physically possible within the limitations of the then state of the art.

Now, I will say that you can always ask me, well, why don't you put in some more sound proofing? And I say, in effect, in the effect on an airplane design, eventually you get to the point where the damn thing gets astronomic. You use up rapidly all the payload, or to provide payload the size of the airplane gets to be infinite, and that gets to be self defeating, so there is a very, very sharp break between what you can easily make an airplane as a transportation tool, and the most that someone who is concerned purely with noise, to the exclusion of any other element would come up with; these are different points of view.

I believe that in transportation we have to sort of go back to one of the old stories that one of my professors at MIT said, or quips that he made when I was a sophomore, that the most efficient way of running an airplane—or an amplifier, was to turn it to off. That was the only way you could make the output equal the input, and I think the airplane is somewhat the same way.

If you postulate that you are going to have transportation and I postulate that we are going to have transportation, if the American society is going to exist in the form that it is in today, then you must compromise the requirements of transportation and noise to a very reasonable degree, and we believe that we have been steadily making progress towards working that compromise right. Now, in terms of the retrofit, which I think you are alluding to——

Professor **Kerrebrock**. No, no, I am not.

Mr. **Kolk**. To push the noise back down?

Professor **Kerrebrock**. No.

Mr. **Kolk**. All right.

Professor **Kerrebrock**. Let me ask the question in a slightly different way. I think it's clear to all of us that the DC-10, when it goes into operation, will represent a much more effective transportation tool, in your terms, than the aircraft that it replaces.

Mr. **Kolk**. Yes.

Professor **Kerrebrock**. To what extent do you think part of this potential as a transportation tool could have been sacrificed for greater noise reduction?

Mr. **Kolk**. Well——

Professor **Kerrebrock**. This is the question.

Mr. **Kolk**. I knew no way of making that airplane significantly quieter than it was. It is possible to have put multiple splitters in both ends of the fan, and I would imagine that it might produce a reduction of perhaps a further decibel or so. The airplane with, those fitted with those characteristics would no longer be a transcontinental airplane. Now, that is the kind of compromise you have to make.

Now, we are not going after the last decibel that is going to cost 10 times as much as all the other decibels put together; that is the point I am trying to make. We can't afford to.

But we can go a very, very long way in the design of a fluid airplane to carry an awful lot of stuff. There is 3,400 pounds of soundproofing in the DC-10 in those nacelles alone. That is deadweight soundproofing, and I believe that that was all we could—well, you are going to have some other people that are going to talk about that in detail, and I shouldn't waste the time.

Dr. **Meyer**. Any other questions?

Professor **Kerrebrock**. No.

Mr. **Martin**. Just one question, Mr. Kolk; will the general public living under the flight path, with the mix now bringing in this new aircraft, will he in anyway be able to recognize what has happened with the advancement?

Mr. **Kolk**. My own ears tell me so. I can tell the difference if I am sitting on my patio, with my drink at the end of the day, what kind of airplane is going over because I recognize their noise signature, and I really believe that anyone who is exposed to this kind of noise for any period of time, can take some interest in it, can very, very rapidly, and very quickly develop that knack. There is no doubt in my mind that, for instance, a 747 makes a great deal less noise than a 707 in practice around communities, and the limited demonstrations that we have made with the DC–10 have been really very startling in this regard. There is no doubt that they can be heard, and they will be significant.

Mr. **Hinton**. Mr. Kolk, will you maintain the candor of your remarks in responding to this question with regard to the FAA? I wonder if you could tell us if you have any knowledge or reason why the FAA has not, as you have recommended in your statement, established operating criteria for noise reduction, as well as you have suggested, promulgated a model zoning ordinance advising communities around airports in this country what the situation is like, and is likely to become?

Mr. **Kolk**. Did I say that I wanted the FAA to make the model zoning ordinance? I don't think they are the appropriate body, but I think someone has to.

To go back, now, in terms of the procedures, I think that FAA is moving towards procedures, and I think you very well are aware of some of the behind-the-scenes battles that we have between people who are charged primarily with the safety of the enterprise and people who are charged primarily with the noise aspects of the enterprise.

It's always easy for a guy that is in charge of noise to say that a guy that is in charge of safety is a hidebound reactionist, and I think that we have to recognize that he has the basic human charge that we must protect.

Now, I think progress is being made, but I would agree with you, with your inference, that it ought to come faster.

Mr. **Hinton**. Thank you.

Dr. **Meyer**. Before passing on, since I am the man who is the hidebound, hard-nosed human protector, Mr. Kolk, let me ask you a question, based on your testimony and your very candid statements here. How do you feel about the way the administration proposes to deal with this question of zoning and noise in which the Federal Government sets what amounts to point emission noise source standards for a variety of transportation and other sources but leaves to the States and their political subdivisions the responsibility, as well as the authority? And I emphasize "the responsibility," placing it squarely where it should be for establishing what amounts to use requirements or zoning provisions; and in this structure, of course, we in the Environmental Protection Agency will be charged, under the legislation now pending in the Congress, with working with the States to develop model laws and ordinances. Now, it's apparent that there has to be a bridge between these things. And my question is, how do you feel about a situation in which we may develop what amounts to permitted human response zones of influence to noise which the States adopt, leaving it up to the industry and those concerned with safety and everything else to meet those requirements?

It's not like saying, well, this is the noise exposure we expect, and we don't expect any complaint at these levels, so that is all right.

Mr. **Kolk**. Well, I think this is, in some respects, somewhat idealistic, and my point there would be simply this, that the noise sources and the noise annoyance that we get today in our industrial complex are caused by industry and transportation; industry and transportation are the things that separate us from the 17th-century rural life.

The population in the United States is too high to maintain itself at anything above starvation levels, and with the kind of industrial complex that existed in the 17th century, if you want to go back to the 17th century, you are going to have to get rid of 90 percent of the people in the world.

Now, I think that this is somewhat unrealistic, so I think that we have to strive to do the greatest job that we can, but we have to recognize that not only is noise environment per se important to human beings, but certain other things, like basic eating, are important to them, too.

Dr. **Meyer**. Before I pass this on to any other panel member who would like to ask you a question—and we must move on with our activities—I note that in your prepared statement you are of the view that the more pressing basic research need is in the area of human response to aircraft noise, and in this you also include the need for responsibility for determining environmental impact of the transportation system at large.

Mr. **Kolk**. Yes.

Dr. **Meyer**. Do you feel that this should be done by the same agency that is setting the standards for the aircraft, as you propose, which would be the FAA, or should it be done by an independent agency, such as the Environmental Protection Agency——

Mr. **Kolk**. Well——

Dr. **Meyer**. Or should it be done together—I will give you several options here.

Mr. **Kolk**. I think my answer to that may be flippant, but I think knowledge is knowledge, and it doesn't matter who pays for it. The problem is that there are a number of things that we don't know about this problem that we really need to know.

I have in mind a NASA finance study that is being published—it was performed by an outfit called TRACOR, where they did a lot of sociological work, and it's quite evident from the results that they had that a meaningful reduction in noise reaction of the people who do react to noise require so many decibels, so that it is clearly well beyond our technological grasp today.

Now, I don't know whether this is right or not, but they spent a lot of money saying that I think that we need some cross checking on this sort of thing, and if it's true, this is a very brutal blow.

Dr. **Meyer**. I think what the Agency, under the mandate from the President and the Congress, is contemplating is a broader interagency and government type of industry and public approach to this problem. This is what I was trying to elicit.

Mr. **KOLK**. Yes. Well, that is right.

Dr. **MEYER**. Thank you very much. Any other questions?

Professor **PLAGER**. Mr. Kolk——

Mr. **KOLK**. Yes.

Professor **PLAGER**. Am I on? From your statement, and from what my friend, Mr. Hinton, tells me, I understand that American Airlines has been one of the leaders among the airlines in addressing the problem of noise, and if this is, in fact so, I would commend you and American Airlines for doing it. You do make a few statements in your remarks that I would like to perhaps get you to elaborate on, if you would, for a moment. You make the statement:

> Legislation passed in California—and proposed in New York, Maryland, and Connecticut—would, although primarily directed at SST's, sharply restricts—if not ban completely—all existing commercial jet aircraft from these States. The most efficient long-distance transportation system ever developed could be paralyzed, if not destroyed, were such rules allowed to stand and be enforced.

That is a quote from your statement?

Mr. **KOLK**. That's right.

Professor **PLAGER**. I find that, Mr. Kolk, to be quite strong language, and I wonder perhaps if you really mean that. Let's explore for just a moment with you the California legislation, because that is the one that is most pressing. Actually it's not legislation so much as it is both legislation and regulations of the department of aeronautics of the State?

Mr. **KOLK**. Yes.

Professor **PLAGER**. As I understand the California regulations, Mr. Kolk, in fact what will happen is that no airports, no aircraft operation will be hindered or stopped or destroyed until a number of things happen first.

The first thing that must happen is there must be a determination by each county in which these airports are situated that they have a noise problem of such dimensions as to require invoking the procedures. This determination is itself subject to appeal, public hearings, and a whole process of determination there.

Second, I take it part of the concern may be with the 65 dBA standards set out in those regulations, and yet that is deferred, the effective date, until 1986, at which time, hopefully, some of these aircraft that you refer to as being retired from service will have been retired—and without going into details as to the California procedures, there is a substantial provision detail section for variances.

Now, my information, Mr. Kolk, and this is what I would like you to comment on, the best information I can find out about the California plan is that nobody really knows exactly what the impact of the operation of this proposed program will be because of these several variables that nobody has had experience with, and I wonder how you could make the blanket, unqualified statement that anything like this must necessarily paralyze, if not destroy, the entire aircraft industry?

Mr. **KOLK**. Well, my impression from studying the work, and also from talking to a chap named Moore, who runs the Los Angeles airport, was that if you discount legal maneuvers, which I really don't think are binding, one shouldn't take solace in the fact that you can hire a lawyer and wiggle out of trouble for 15 years.

Professor **Plager**. My colleagues in the profession take solace in that, Mr. Kolk.

Mr. **Kolk**. But if you literally did what the intent was, you would restrict operations at Los Angeles airport right now abruptly to about 20 percent of their present level.

Professor **Plager**. Are you talking about the 65 dBA requirement?

Mr. **Kolk**. This is the cumulative.

Professor **Plager**. Yes, 65 CNEL, but that won't go into effect until 1986.

Mr. **Kolk**. I am really talking about the initial cumulative requirement. I can't think in terms of dBA because I am calibrated to EPNdB.

Professor **Plager**. Everybody has their own secret system.

Mr. **Kolk**. Everybody has their hang ups. Everybody that gets into this game is an expert by definition, and he invents a new unit, and now we have chaos, and we have more people inventing units than we have Carter inventing little pills, but really this is an aside in relation to California. It was my impression that we would have a very, very great difficulty in the immediate future in noise levels at Los Angeles, and resulting reductions in frequencies, but now I also——

Professor **Plager**. Assuming——

Mr. **Kolk**. I also mentioned certain other proposed legislation in certain other States which I am sure about. The New York legislation which was referred to would, in fact, ban any airplane that I know about except the DC–10 from operation in New York State, in the last form I saw. Now, it may have been changed since then, but I think I had a copy of the last one.

Professor **Plager**. Right. That legislation hasn't been adopted, has it?

Mr. **Kolk**. No, it has not.

Professor **Plager**. Let me ask you another question, if I may, Mr. Kolk.

On pages 14 and 15 of your remarks, and in your statement, you argue for a single regulatory agency, and one consistent set of rules. It was not entirely clear to me whether you meant consistent set of rules governing operations or whether you meant governing airport operations or whether you meant governing land use problems, or which part of the total dynamics of airport noise you were dealing with, and yet back on page 2 of your statement you start right out saying—and I think accurately—that each airport, each community has its own individual problems; no cure-alls are in sight.

Now, I wonder, do I misread it? It seems to me that there is a problem in relating those two ideas—that is to say, if indeed we must turn to a single—and I presume you mean Federal—cure-all to have a consistent set of rules for the whole show, then I wonder how you would deal with this problem of the individual community and State difficulties and variations that you probably referred to.

Mr. **Kolk**. Well, this is a very difficult subject. You have to accept certain constraints. It's impossible, on the one hand, to comply with a law, a local law that is beyond the capability of your flying machines to comply with.

In other words, it's possible to erect local noise ordinances, any one of which are of such severity so that the operator of aircraft has only one choice, and that is to stop operating.

Professor PLAGER. Wouldn't that be true of a Federal law as well? Couldn't there be an equally observed Federal law?

Mr. KOLK. That could be true of a Federal law.

Professor PLAGER. Yes, so we are talking about observed laws, not necessarily local laws?

Mr. KOLK. But I believe there is a very great danger of observed local laws.

Professor PLAGER. How about observed Federal laws?

Mr. KOLK. I think there is some danger of observed Federal laws, too, but I don't think this is really anywhere near as difficult a problem.

Professor PLAGER. Why would that be?

Mr. KOLK. Well, for instance, it tends to only be—there tends to only be one forum to fight it out in. There aren't very many people in the world that can gallop around and attend local hearings. We very rapidly run out of noise experts in this business.

Professor PLAGER. And yet the 20 million people who are predicted to be affected by airport noise operations aren't all situated in Washington; they are all over the country, including the State of Illinois.

Mr. KOLK. No, but they have elected representatives in Washington.

Professor PLAGER. Who don't have to hear the noise because they are not here. One further comment, if I might—or question, Mr. Kolk. You put a good deal of emphasis—and it has been most helpful—in your statement on things that the airlines can do, and things that—the improvement that can be made in the equipment.

You hardly mentioned, if I understood your statement, changes in procedures, operational procedures, such as landing procedures, such as this question of changing to a 3 percent glide path—again, you know, everybody is an expert—I read that somewhere, such as takeoff procedures. These are the kinds of operational procedures that weren't dealt with very much in your statement. Is that a subject for somebody else's are or how do you feel about that?

Mr. KOLK. Well, I made certain statements in the prepared testimony which do—in my prepared statement—which do treat somewhat on that subject. I do feel that you are going—I notice on the program this afternoon that you are going to have some real airplane drivers on the panel, and I would prefer to defer to those airplane drivers.

Professor PLAGER. Fine. Thank you, Mr. Kolk.

Dr. MEYER. Doctor Whitcomb.

Dr. WHITCOMB. I hope you don't cite the TRACOR study as evidence for not reducing aircraft noise by three dB when you can—because in a sense you are correct, their studies show if you can hear noise at all, you are going to be annoyed, and it didn't matter too much how loud it was. The noise wasn't the only means, variables and annoyance, but if you reduced noise 3 dB, you are going to reduce the size of the footprint audibly on the ground, and that means fewer people hear it, so even the TRACOR people would say, yes, you should reduce the noise.

The other thing you were commenting primarily about the benefits of future aircraft having noise reduction in them, and sort of running the concept of retrofit down.

I am concerned about that because though it has a lot of problems, it is not a total answer; it is a personal answer, and most of the objections are essentially economic if you boil them down ultimately.

Why couldn't the cost of this retrofit be put on the ticket and let the passengers who benefit have, you know, one half of one percent fare increase; how do you feel about that? Competitively it wouldn't bother you in competition with either the airlines or not much with other carriers, other forms of transportation.

Mr. KOLK. Well, I think in the end this is going to—it is going to appear on the ticket. I don't think there is any doubt that it is going to appear on the ticket, and I am not adamantly opposed to retrofit on the principle of retrofit, but I do feel that the potential benefits of retrofit in light of the—have perhaps been somewhat overplayed in the economics of, economic hazards of it are perhaps underplayed in the general scheme of things, in my experience in dealing with these kinds of matters, but were a suitable retrofit scheme to come along, then I think we are really quite morally bound to try to find a way of financing it.

Our problem right now is that there really is a lot less available on the open market than is generally realized in terms of how many decibels do you buy for what dollars, and what performance.

Professor PLAGER. One quick comment, just to follow through; you did call for some research on human responses. Sometimes the research can simply be a way of putting off dealing with the problem.

I would invite your attention to some 60-odd studies cited in the recent proceedings of the SAE–DOT conference, many of them dealing with this very problem, including things like "Use of Social Surveys for Measuring Communities in Response to Noise," and "Effects on Mental Hospital Admissions and Aircraft Noise," so I think there is probably—maybe we know as much as we really need to know that people are affected by it.

Mr. KOLK. I am aware of those papers. I happened to be cochairman of that conference.

Professor PLAGER. Maybe we don't need too much more research, then, perhaps.

Dr. MEYER. Very good. Mr. Kolk, I appreciate the paper that you have given. It will be most useful to the EPA in structuring its plans for implementing legislation, and also in submitting a forthright report to the Congress of an analysis of this total problem, and I appreciate very much the candor with which you have responded to the questions.

Thank you, sir.

Mr. KOLK. Thank you.

Dr. MEYER. We are very grateful. The next witness to appear in our discussions about aircraft transportation is Mr. John Cornell of the General Electric Co.

Mr. Cornell, you may summarize, if you desire, in the interest of time.

Mr. CORNELL. I think I should like to talk my way down through this. I think there are some things to be said, with the use of the slides, and so forth.

Dr. MEYER. Very good.

STATEMENT OF WILLIAM G. CORNELL. GENERAL ELECTRIC

Mr. CORNELL. I am sorry about the John. My name is Bill Cornell. My title is acoustics and aerodynamics consulting engineer on the staff of the acoustic design technology operation of the General Electric Co.'s aircraft engine group.

Since joing GE in 1941, I have worked in the aircraft engine group for 25 years in a variety of engineering assignments, the last 5 years of which have been on aircraft engine noise.

The General Electric Co. has been producing aircraft engines since the early 1940's, and aircraft turbosuperchargers before that. Our major engine noise activity began with the commercial engines for the Convair 880 and 990 aircraft, in the middle to late 1950's, although we have been doing noise work on military engines for some time before that.

Aircraft engine noise control activities in GE over the past decade have included work on programs as varied as the reheat turbojet engine for the Boeing supersonic transport, all the way out to high bypass ratio lift fans for vertical takeoff and landing and short takeoff and landing aircraft, and the high bypass ratios, ratio CF6 engine, whose first application will be in the McDonnell Douglas DC–10 wide bodied subsonic transport which will enter the commercial fleet next month, as Mr. Kolk said.

Today's discussion will be devoted to the noise control considerations in the development of the CF6 engine to try to shed a little physical light on what can be done, and how it is done.

In deference to the chairman, I shall skip through some of this.

Why don't we look at the first picture.

[Showing of first slide in series.]

I will try to operate this shotgun over my shoulder.

Dr. MEYER. May we extinguish the lights so the panel and the audience may see this, please; these over here also, please. Thank you.

Mr. CORNELL. Let us start off in our discussion of the CF6 engine by comparing the various engine noise sources as shown in this slide.

The schematic illustration shows the turbofan engine—I have a picture coming up later that will show more of the inside, but here we have a turbofan engine where a relatively large diameter fan, so-called like a big propeller inside of a can, sucks in all the engine airflow in the front and puts some of it out the bypass stream, and the rest of it through the core engine, which then goes out the back.

The bypass stream is the air that goes around the central or core engine. You can think of a core engine as crudely like a first generation turbojet engine that did not have any fan on the front.

The bypass airflow emerges in the cold, relatively low velocity fan exhaust stream, while the core engine airflow emerges in the hot, relatively high velocity jet exhaust.

Now, I spoke of high bypass ratio engine. I should define what I mean by bypass ratio. The ratio of the airflow which is bypassed around the core engine to the airflow that goes through the core engine is bypass ratio.

The four noise sources of a turbofan engine are shown on the figure [indicating]; forward-radiated noise from the fan and the compressor, aft-radiated fan noise, turbine noise and jet exhaust noise.

Forward-radiated noise comes from the fan which is immediately within, and the core engine compressor, which is down further within; aft-radiated fan noise comes out the fan exhaust, from the fan blade itself; turbine noise comes out the core engine exhaust from the turbine which is well upstream; fan exhaust, that is, the noise source, and jet exhaust noise comes from the mixing of the hot jet with the atmosphere.

The fan noise in this type of engine, high bypass ratio engine is the major noise source. The compressor turbine and jet exhaust noise being relatively minor in their contributions to the overall engine noise—and parenthetically I should say physically about noise, if two noises are going on at once you only hear the loud one. You don't hear the clock ticking when the truck went by kind of thing; that applies to this kind of noise also.

Let's talk first about the jet exhaust noise; comparison can be made among three types of engines, aircraft jet engines. First, the early turbojet engine, such as General Electric's CJ805–3 turbojet engine for the Convair 880 airplane. In this case the bypass ratio is zero, by definition, as I mentioned parenthetically before.

The second class of engine is the later low bypass ratio turbofan engine, such as the General Electric CJ805–23 engine for the Convair 990 aircraft—in this case there is a fan—it has a bypass ratio at full power of about 1.5 to 1; 150 percent of the core engine airflow goes around in the bypass flow, and then finally, the one we are talking about today, the modern CF6 turbofan high bypass ratio engine has a full power bypass ratio of about 6 to 1, six times as much flow as in this low velocity, cold flow on the outside of the core engine flow, six times as much as the core engine flow.

Now, getting to the point about the flow reduction in the high bypass ratio engine, as bypass ratio increases as the relative amount bypass flow increases, the average exhaust velocity of the fan and jet exhaust streams decreases markedly, and the jet noise is reduced.

Thus, to go back to my three classes of engines, just to cement the point, the major sources in the three classes of engines are jet noise in the turbojet engine, because it is almost jet noise; a combination of jet and fan noise in low bypass ratio turbofan engines and fan noise alone in high bypass ratio fan engines.

Therefore, jet exhaust noise is well below fan noise, and consequently contributes little to overall engine noise at all operating conditions in the CF6 engine.

Turning to further noise sources, the CF6 turbine which drives the fan is located within the core engine—you will see it better in further pictures, but it is upstream of the exhaust, up in here (indicating).

This turbine was designed having relatively lightly loaded stages, light aerodynamic loading on the turbine blading which results in turbine noise levels which do not contribute significantly to the overall engine noise, and this has been demonstrated by measurement of the turbine noise—and I might say that I have made an attachment of a substantiating document that discusses that in somewhat more detail.

Dr. MEYER. That will be in the record.*

Mr. CORNELL. Fine.

The core engine compressor of the CF6 engine is designed and so placed in the core engine well down inside, as you will see from the future picture that I haven't shown you, but will in a little bit, so placed in the engine that it does not—the compressor, that is, does not contribute significantly to the overall engine noise, and this also has been demonstrated by noise measurements.

Thus, as previously stated, the overall engine noise of the CF6 engine is predominantly fan noise radiated out the inlet and the fan exhaust [indicating].

Now, finally, let's get to that next picture that I said three or four things about and see if I remember what I said about it.

[Showing of next slide in series.]

OK. Here is your fan [indicating] like the big propeller, way up front.

There are the stationary blades behind [indicating]; there are some struts to hold the outside on; the core engine compressor I keep telling you about is hidden down in here [indicating], so you can see what I mean when I say it's very hard to imagine the noise sneaking out through all those blades, et cetera, it's hidden away inside.

The turbines are well in the back and well upstream here [indicating], and very importantly, I should point out to you.

I will now very carefully try to draw acoustic treatment lines the inside of the duct here [indicating], and it lines the inside of the duct here [indicating], and I will talk about that in more detail later, but imagine an acoustic treatment to be—and I always like to have a ceiling to point to, but we don't have it in King Arthur's Room—acoustic tiling on the ceiling in a typical office is the same kind of thing as we are talking about here, except that imagine it is very heavy duty type material—and I will talk about that.

These are the parts of the CF6 engine [indicating].

As we look at the engine picture we should comment that the CF6 fan itself, as the major noise source, was designed with noise as a major design consideration from the beginning, and not as a bandaid fixed after the fact.

Important noise control measures taken were elimination of inlet guide vanes—some of these Mr. Kolk mentioned. In other words, there are no stationary blades, no stationary blades or inlet guide vanes ahead of this fan rotor. This cuts down a certain amount of fan whine. You can sort of imagine this from thinking physically about how a siren works, if you will, as rotating blades run past the stationary blades, a silent effect happens.

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* This material is on file at the Office of Noise Abatement and Control.

Second, the use of large axial spacing between the fan rotor blades—it's a little hard to see that [indicating]—and outlet guide vanes.

I keep talking about more pictures; you will see in later pictures there is a relatively large axial spacing between the fan rotor and the fan stator. This cuts down on more of this siren-type noise that I was talking about.

The second thing—or third thing—I better stop numbering them lest I forget the number—the stator vanes are swept or canted, swept like the wing of an airplane. Perhaps you can't see it from the picture, but there has been made an optimum choice of ratio of number of rotor blades and stationary vanes. I think you can see there are relatively fewer rotary blades than there are stationary vanes, and this has something to do with minimizing fan noise.

There is an optimum balance between fan rotational speed and blade aerodynamic loading that I talked about before—these things must be balanced, and there is an optimum design of the so-called booster stage between the fan exit and the core engine compressor inlet—and I must say this picture is a beautiful work of art done with an airbrush, but my next picture will show you what I mean by a booster stage.

[Showing of next slide in series.]

Now, so much as to what was done. Now, let's show some data on what came out.

Let's have the next picture, if you would be so good.

[Showing of next slide in series.]

In order to validate the acoustic design, a 41 percent scale model of the CF6 fan was used to obtain acoustical data over the operating range of the fan.

The picture you are looking at now shows the measured noise plotted vertically along the 200-foot sideline, meaning imagine a line through the axis of the engine, through the center of the shaft, and walk out 200 feet to one side, and if we can move ahead, or to perhaps this bottom scale it will be a little more visible—I am afraid I have got heads—the percent thrust is being shown at full takeoff, full thrust and low landing down to around 40 or something like that.

A parenthetical remark, you have heard the word EPNdB—I will be talking about perceived noise decibels and PNdB as I talk here. This is based on measured decibels and objective measurement with microphones and reduction equipment, plus the calculation that allows for annoyance, so the perceived noise decibel was, as was remarked before by Mr. Kolk, I think, is relative not only to physical measurement, but to human annoyance, and human annoyance is the name of the game we are talking about, so I am talking about PNdB.

This shows the measured noise along the 200-foot sideline in perceived noise decibels compared to the design predictions, with and without the low noise features discussed above.

A noise reduction of 5 to 9 PNdB over the operating range resulted from use of the low noise features. A reduction of 5 to 9 decibels is equivalent to removal of between 68 and 87 percent in fan noise energy, in source noise reduction—that is, before addition of the acoustic treatment in the fan ducting.

One predicts if we did not use those in this engine with some kind of a scatter band from uncertainty, because that is not an engine we would want to design anyway, if we did not use the low noise features, we would predict this, our prediction of the engine as designed with the low noise features, but without the treatment—because we tested it that way, is the line [indicating], and our little scattering of cherries hits the prediction pretty decently, but the main point is a noise reduction of somewhere between 5 and 9 has been achieved without the treatment. This is called source noise reduction.

Now, to give you an idea of 5 and 9, there are all kinds of number games you can play with decibels. I will give you two calibrations, and I will go back to the way I wrote this down.

I would like to say that if you have a given sound source, and it's making a racket, and you reduce the energy of that source by one half, you take out 50 percent of the noise, you get a 3-decibel reduction. That is an energy basis, or since 10 is a good, round number, if you want a 10-decibel reduction, you need to take out 90 percent of the noise, and you only have 10 percent left. This is the one [indicating], but again after just telling you that subjective annoyance is important, a 10-decibel reduction is something like half as annoying or half as loud, if you will, without getting into a lot of detail, that is another kind of an index you can use, so 10 dB is quite a bit in impact.

Let's look at the next picture, No. 4.

[Showing of next slide in series.].

This shows a schematic drawing of the CF6 engine, indicating placement of the acoustic treatment. As noted above, the booster stage can be seen better here, as can the cant of the outlet guide vanes. The acoustic treatment was developed to suppress the noise radiated by the fan after the low noise features were added, including major consideration of the detailed frequency spectra of the fan noise as generated over the full operating range from approach to takeoff power.

A so-called resonator-type treatment was chosen to best suit the engine environmental constraints, including high air velocity, and potential problems associated with soaking various liquids, freezing and thawing, and general contamination. The basic type of treatment consists of a perforated face sheet on the airflow side over a structure partitioned into cavities which resonate at chosen frequencies in order to aid absorption of sound energy.

That is, again think about your ceiling tile—particularly those of you who have hung some, and as you know, there are perforations into which the sound waves bouncing up and down little amounts of airflow can go, but we go further than just having the perforations. We have a sort of an eggcrate structure behind with the volumes of these little cavities in the eggcrates tuned to take out the kinds of frequencies we want.

On the basis of exhaustive testing on the 41-percent scale model fan, as well as laboratory bench scale testing, optimum deployment of treatment in the fan passages was developed, and you are looking at where we finally deployed it [indicating].

Two types of treatment resulted, single-degree-of-freedom—we abbreviate that SDOF, or single-degree-of-freedom for the inlet outer wall and exhaust inner wall, and multiple-degree-of-freedom, or MDOF treatment for the fan frame and the exhaust outer wall [indicating].

The SDOF, single-degree-of-freedom treatment consists of a perforated face sheet over a vertically partitioned cavity having a single resonance frequency.

And now I do want the next picture.

[Showing of next slide in series.]

The MDOF treatment shown here [indicating] is more complex in cavity geometry, since it is designed to provide multiple resonance frequencies, to meet engine structural requirements, and to gravity-drain any liquids entering the cavities.

I think you can see from the solid walls and the slices in them the kinds of things I am talking about.

Dr. **Meyer**. Yes.

Mr. **Cornell**. There is more detail on that in the substantiating documents.

Now, let's have a look at the next picture.

[Showing of next slide in series.]

The noise reduction obtained by the use of the acoustic treatment is shown, first in this picture [indicating], which shows takeoff conditions, 100 percent thrust—and it's hard to see what I have got, but it is a scale of PNdB, as I used before, and plotted across the bottom from 0° to 180°. It says "angle from inlet"; it means on the scale 0° as directly out in front of the engine, 180° is directly out behind the engine, and 90° is right off to the side of the middle of the engine, and so we would call this in engineering terms, a polar plot, and you will see where the maximum noise shows up. It's in this 110-odd degree aft quadrant, as we will see, and you will see that the noise data shows by traversing around the engine, with numerous microphones, that if I have my noise reduction features only without the treatment, I am up here [indicating], and if I add the treatment, I come down here [indicating], so this gives you an idea of how much the treatment paid off.

Indeed, at the maximum point in the aft quadrant, something like four PNdB reduction, the next picture shows the same kind of consideration.

[Showing of next slide in series.]

This is for 40 percent thrust, which is a power setting in the landing approach range.

Now as a result of the low noise features and the acoustic treatment, the noise level of the CF6 engine has been reduced from about 13 to 15 PNdB over the operating range of the engine. Physically a reduction of 13 to 15 decibels is equivalent to a reduction in sound energy of 95 to 97 percent. Accordingly, the CF6 engine has achieved noise levels significantly below those of previous engines, and represents a major step forward which will assist in prevention of further escalation of airport noise.

Thank you.

Dr. **Meyer**. Mr. Cornell, you are obviously not only an excellent engineer, but you are able to translate complex subjects into meaningful and understandable terms, and we appreciate it very much. Panel?

Professor KERREBROCK. I think, Mr. Cornell, we can all agree that the CF6 represents a major improvement in engines. I have some questions I would like to ask, however. In your verbal statement one could have been led to believe that indeed the CF6 engine was optimized to reduce noise. Now, I don't think that you really mean this, and, in fact, if we look back at page 3 of your written testimony, the statement you make is that the CF6 fan was designed with noise as a major design parameter, and an optimum design was obtained balancing effects on noise, aerodynamic performance and weight, meaning to me that indeed you balance these several factors—and I think that Mr. Kolk's testimony is consistent with this; what I would like to know is if you can tell us just to what extent the performance of the engine was compromised in order to reduce noise to what, by what fraction was the direct operating cost, say, of the aircraft increased in order specifically to reduce noise?

Mr. CORNELL. Well, before I answer that detailed question, I would like to back up and put the—answer a broader question; then I will get back to your detailed question. What I attempted to do was to show that fan noise was the largest and most important noise source in this engine, but that we had very definitely optimized the complete engine for noise, as Mr. Kolk said, it was a clean sheet of paper, and we knew what the noise ground rules were to be, and we made for sure we would not hear from jet noise per se, and this was by the choice of the bypass ratio as I discussed, then we made for sure the turbine noise wasn't being heard from, and as detailed in the substantiating documents, we went back in and really made for sure about that.

The same with the compressor, but we knew the fan was going to be the noisemaker because it's a large, high rotational speed, high airflow. It's a noisemaker, so that is why I concentrated on it, and we optimized on that fan design from the beginning.

Let me remark, if you go back to the kinds of engines I talked about in our Convair airplanes, and you looked for any of the features that I discussed, except in the case of the fan engine for the Convair 990, which happened to have no inlet guide vanes, except for that fact, the spacing and the blade choice and all the other things, I went through this, this was not a consideration in designing an engine.

Professor KERREBROCK. No, I understand that——

Mr. CORNELL. I am giving you the background.

Professor KERREBROCK. All right.

Mr. CORNELL. So that all the features that I talked about are generic to this generation of engine, and they were introduced. Now, you say what penalties? Well, Mr. Kolk already indicated a little bit about 3,400 pounds being lugged around, and not paying for a ticket, and this kind of thing. Now, I am talking out of line, but that hurts. I mean, I am an engine type, and I think you should ask these questions of the airline people, like Mr. Kolk; however, let me say as follows: I know that we paid for weight, for example, even in addition to the acoustic treatment, Mr. Kolk was talking about, I show you how we moved apart the rotating and stationary blades; we added a hunk of shaft casings, and the rest of it that Mr. Kolk was carrying around, too, so to speak; every pound in the aircraft engine business, or airplane business, every pound you add that doesn't pay off, that is bad.

You asked the right question about DOC (direct operating cost); I don't happen to have that number in my head, as an engine person I frankly don't, at the moment—as an engine person I think that you really should ask that question of the person who operates, such as an airline person, but there have been performance penalties largely from weight.

Aerodynamic performance, there is some penalty as you scrub past the inside of a smooth wall, it has little holes in it, there are some losses and so forth—I would say total aerodynamic penalties so far in this design, not very large, plus positive small penalties—not much to worry about.

I would say weight, yes, indeed. Going directly on top of direct operating cost, weight penalties definitely, but I don't have a quantitative answer for you.

Professor KERREBROCK. All right. I have another question now. GE, if I understand correctly, is under contract to NASA to develop the prototype quiet engines——

Mr. CORNELL. Yes.

Professor KERREBROCK. Which are, in a sense, an extension beyond the CF6 in the quieting of aircraft engines.

Mr. CORNELL. Right.

Professor KERREBROCK. I wonder if you could give us some indication of two things: First, on what time schedule do you think that the improvements that are represented by the quiet engine can be incorporated in production engines, and secondly, if possible, again this same question, what performance penalty is going to have to be accepted in order to reduce the noise level by, say, the next 10 EPNdB?

Mr. CORNELL. This is a good question. I always like to answer broader questions, but let me first talk about—and I don't want to run the time up, I understand, right?

Dr. MEYER. Go ahead; this is good.

Mr. CORNELL. The quiet engine program is a very important thing. I want to state first that the General Electric program is a technology development program rather than an engine development program, that which we have been asked to do is to develop technology. This is an important consideration; the FAA made this abundantly clear in their ANPRM, talking about retrofit that we were talking about before.

We must not be deluded—and I am not trying to brag down a program that we are all wound up in, or unbrag it, but rather this is not an engine development program to put it in the fleet right then. Sure enough we are working with flight weight hardware and all that, but it really is more than a normal technology program.

What kind of goals has it got? NASA has themselves announced publicly that they would like to see—well, they would call it, say, as an engine, 15 to 20 PNdB down from today's engine, so you look at my 10, and take my 10 off, and it's the same kind of a number. They are looking for another 5 to 10 PNdB range over and above that thing, like the CF6. That is what NASA says they are looking for finally, and we are developing technology for them.

The program began in June 1969; it will be over in, like, August of 1972, our end of it, so to speak.

I guess I can't speak too well for NASA, but they will have the technology in their hands at that point, so if somebody wanted to lay down, depending on how good the results are and so forth, if somebody wanted to lay down an engine design, maybe like the first of 1973, I guess I am making a guess, an engine design could be laid down, and a typical engine development cycle is something between 3 and 5 years to have it ready, and I think that is the kind of an answer you were looking for.

Professor **KERREBROCK**. Yes. 1978?

Mr. **CORNELL**. Something of this order; yes.

Mr. **HINTON**. Mr. Cornell, the quiet engine program has always amused me because I think it's a misnomer; it should be something like "quieter" or something, because it's still going to have more noise, we are still going to have aircraft noise, even if a quiet engine with 10 dB down from a CF6 would be like a third generation of commercial jet transport engine; is that your opinion?

Mr. **CORNELL**. It could be used for such a purpose, indeed, right.

Mr. **HINTON**. And so from that standpoint you say it's very important that this investigation continue. I am glad to hear that.

I am interested in the CF6; very briefly can you tell me whether or not the engine is amenable in its thrust to noise curve, if there is any direct line, you know, some engines, for example, JT3D is not very amenable to noise reduction unless you get the thrust reduction, which is very, very high. The noise curve is almost level until the thrust level is quite low. How is the CF6, or typically a high bypass ratio engine in this respect?

Mr. **CORNELL**. I am thinking about what you are saying. You are imagining a curve of perhaps PNdB on the sideline against percent thrust, and you are asking me does it have a steeper curve rather than a flattop curve?

I am remembering, now, but I think it ought to be this way, that the curve is steeper at the low power settings, but it tends to do a little flattening at the high power settings, but I think it is steeper than the JT3D kind of engine. That is my remembrance. As I said, I am trying to think. What I just said sounds reasonable, but I am remembering. All right?

Mr. **HINTON**. All right. Thank you.

Professor **PLAGER**. Who wrote the noise specs for the CF6 engine? Was that McDonnell Douglas?

Mr. **CORNELL**. Who wrote the noise specs?

Professor **PLAGER**. Yes. In other words, who called for making the CF6 a quiet engine for the DC-10? Whose idea was that, who planned it?

Mr. **CORNELL**. Well, we have contractual agreements with McDonnell Douglas which have very specific noise numbers in it, but in all deference to Frank Kolk, who may or may not still be here, let's not forget that he was party to this, and so were many other important airlines, as that airplane, and as this engine develops, a lot of the airlines were right in the middle of the thing, but the specific spec that we are talking about for this engine, that is going into that airplane next month, was specifically contractually agreed to between us and McDonnell Douglas.

Professor **Plager**. Part of the—I guess part of what I am reaching for, Mr. Cornell, is what is the responsibility, the corporate responsibility of a company like General Electric for initiating or assuming some initiative in developing quiet engines, quieter engines? I assume that the airlines don't need to specify the fan blades shouldn't fly off; I assume that the engine manufacturer has some responsibility for some parts of producing an effective engine. What is your view of the manufacturer's responsibility for incorporating quiet into the engine, whether demanded by the airlines or not?

Mr. **Cornell**. Well, I guess you can answer this in a variety of ways, but on purely selfish basis, we decided some years ago that we wouldn't be selling any if we didn't make them just as quiet as we could. On the other hand, my company is large enough that we feel we can be statesmanlike, and we have environmental ideas in our corporate office which have been publicly announced and so forth, so for all reasons we really are working at the problem, and we don't intend to quit.

Professor **Plager**. Thank you.

Professor **Kerrebrock**. Could I inject a question before we drop this point? Wasn't it actually the impending FAR 36 which set the noise regulations for the DC–10?

Mr. **Cornell**. Not really. This was sort of concurrent, I think. FAR 36 began in 1966 with the initial letter by Joseph Blatt, Administrator of the FAA—Associate Administrator, and this kind of thing you will hear more from Mr. McPike shortly, who will tell you that we have even got, we have even done better than those regulations, but obviously they were something that we knew were coming and so forth, but we have done better.

Dr. **Whitcomb**. This is not a question as much as a comment, but one thing that disturbs me is we have quiet, or quieter engines for 20 years, and this really isn't your problem, I understand it's a combination of the companies, the engine companies, the airplanes and the airlines, when a more efficient engine comes up, thanks to your designing and such, typically what happens is that it's put not on the initial airplane that it might have been designed for, but as a second generation comes along, it's put on an airplane that has a stretched fuselage, carries more passengers, more weight, and makes more money.

And had this not happened, a lot of the current problems in airport noise wouldn't have come about; airplanes would have been able to get off the ground faster, into the air and not splattered noise on the community—and I would hate to see this cycle repeated, because engines have been better and better, and what I dislike is what is done with them.

Mr. **Cornell**. These are difficult considerations, and I could comment, but I think it would be smarter if I let the airframer, and also another airline person comment on this particular thing. We know the problem, and we are all working on it together.

Dr. **Meyer**. Yes, we are going to hear from another portion of the aeronautical transportation system complex, the airframe manufacturer; we also will hear from representatives of the Air Transport Association and the airport owners. I have two questions I would like to ask, sir, if I might, in the capacity of the chairman of the panel. First, would you venture a comparison of the cost of the engineering? We asked you a question beforehand about increased operational costs, and you mentioned you start off with a piece of paper. Was there any significant increase in the engineering design costs because of the acoustic and noise considerations?

Mr. **Cornell**. I would say there was, and I don't have a spot number on the back of my mind—this morning I said to myself, "Hmm, suppose somebody asks me how many dollars does it cost for the engineering or the acoustic side of the CF6?" I don't know the number, but I know it's large. I can give you some other roundhouse numbers to sort of fill the hand out.

We probably have tied up in the acoustics business, all in one group directly about 50 people, a roundhouse number, and across the General Electric Co., because we operate as a company, the number is probably more like 85—and I am including people in our research and development center in Schenectady who do far out work on engine noise for us. I am including people at our flight test center at Lancaster, Calif., at the Edwards Air Force Base, for example, so to give you the amount of these people, all of whom are not professional engineers, but perhaps one-half to two-thirds, all of whom are not doing, or did not do in the development cycle of the CF6, because we worked on other problems, but just to give you an idea of the number of people that are wound up, this is a partial out, that kind of thing. In other words, this is not something done by three guys in the backroom. We really mean business, and it did take a substantial effort.

Dr. **Meyer**. Thank you, sir., if you could get some information for the Agency with regard to types of people that were involved in this, and their availability, I would also like to have that.

Mr. **Cornell**. I will very definitely get some information for you.

Dr. **Meyer**. The last question I would like to ask you, which I know probably is in the minds of some of the public in attendance, and certainly those who will be appearing with us tomorrow, is: If you could do this sort of acoustical treatment for this engine, could not some of this technology be utilized in some form of retrofit for existing engines?

Mr. **Cornell**. Well, I think that is a perfectly fair question.

Here we have what we think is very good acoustical treatment, for example, and sure enough, the people who are looking at possibilities of retrofit—witness the NASA contracts with Boeing and Douglas and so forth, use treatment that doesn't look unlike this. This is our very special brand, and we are very proud of it, and so forth, but this general idea of high duty, heavy duty acoustical treatment is all coming along together, so this kind of treatment would be perfectly useful if a retrofit thing kind of happened. This treatment was designed specifically for this engine. You might want to do it a little differently; if we had anything to do with it, we would change thicknesses and cavity size and so forth and so on.

Dr. **Meyer**. Mr. Cornell, thank you for a very illuminating discussion. We appreciate it very much. We are running a bit behind schedule, and since the Environmental Protection Agency is concerned with human beings and their response to the environment, I think that we shall recess at this point, picking up with our planned schedule at 1:15. We appreciate the audience staying with us, and hope you will come back this afternoon. Thank you very much. This hearing is now in recess until 1:15.

(Lucheon recess.)

AFTERNOON SESSION

Dr. **MEYER**. Ladies and gentlemen, the second session of this public hearing on noise and noise problems being conducted by the Environmental Protection Agency is hereby called to order. At this point I would like to continue with that portion of our hearing relating to air transportation.

You have heard from a major air carrier, an operator of an air transport system; you have heard an engine manufacturer's views and his technical data. I would like to ask Mr. A. M. McPike, of the McDonnell Douglas Corp., who is a major airframe manufacturer and contractor, to come forward and talk to us about what McDonnell Douglas and the aerospace industry is doing in the field of noise control. Glad to have you with us, sir.

Mr. **MCPIKE**. Thank you. Dr. Meyer.

STATEMENT OF A. M. McPIKE, McDONNELL DOUGLAS CORP.

Dr. Meyer, panelists, ladies and gentlemen, let me clarify, first, that I have—am I coming through on the microphone?

Dr. **MEYER**. Would you hold it a little closer to you.

Mr. **MCPIKE**. This microphone, is it working?

Dr. **MEYER**. Yes.

Mr. **MCPIKE**. Okay. Let me clarify first that I have only addressed myself in this case to the noise of the DC–10 rather than a more generalized picture of the noise in terms of what McDonnell Douglas has done, though I will touch briefly on the question of retrofit toward the end of the presentation. I will read a portion of the presentation, and I also have some slides that I will use to make the presentation on the screen.

Dr. **MEYER**. Very good, sir, and in any event, your entire testimony, of course, will appear in the record. If you deviate from it, why, your remarks will be transcribed directly, and your entire statement will be included.

Mr. **MCPIKE**. Okay. Very fine. I appreciate the opportunity to appear as a witness at this hearing and am especially pleased to be able to report to you that the McDonnell Douglas DC–10 represents a substantial step forward in terms of improving the noise environment in the communities around our airports.

Most of the information presented will be taken directly from a recent paper I presented to the 12th Anglo-American Aeronautical Conference in Calgary, Alberta, Canada.

This paper is entitled "Community Noise Levels of the DC-10 Aircraft" and is submitted as supporting documentation for this statement.

Dr. **Meyer**. It shall so appear in the record, sir.*

Mr. **McPike**. There is a popular belief that the noise levels of jet transport aircraft have been continually increasing as new models have been introduced into airline service. This is not true.

While some of the later models may have somewhat higher noise levels under some specific conditions they are also somewhat quieter under other conditions and there has been no general trend to noisier aircraft.

There has been an increase in the magnitude of the airport neighborhood noise problems but this is because there are more aircraft and people are exposed to the noise more often rather than because of any increase in noise levels of the aircraft.

The new wide bodied jets will have a beneficial trend on the airport neighborhood noise problem because they carry more passengers.

This means that fewer flights will be necessary to carry a given amount of passenger traffic. This does not necessarily mean that the number of flights will decrease but it will at least decrease relative to the number of flights necessary with the old aircraft which carry fewer passengers.

But this is not the major benefit to the airport noise environment that will result from the introduction of the DC-10.

This new aircraft incorporates several major design features in the engine and in its installation which result in it being substantially quieter than the aircraft in the current fleet.

If I may have the first slide, please.

[Showing of first slide in series.]

Perhaps a very brief description of the DC-10 will help to put the noise level information for the aircraft into proper perspective.

While there will be several versions of the DC-10 at a later date this discussion is limited to the initial version of the DC-10 which will enter domestic service in August.

It is a wide bodied jet transport aircraft—by that the fuselage or body is wider across than the earlier models, and it will carry between 220 and 345 passengers at ranges up to approximately 3,500 nautical miles; it is a long-range domestic aircraft.

It is powered by, as earlier, General Electric CF6-6D engines which are high bypass ratio turbofans in the 40,000 pound thrust class.

One engine is mounted under each wing and the third is mounted in the vertical tail of the aircraft.

[Showing of next slide in series.]

I will turn first to the FAA noise certification requirements that have been discussed several times already this morning. These requirements were not developed fully until after the

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* This material is on file at the Office of Noise Abatement and Control.

DC-10 design had been initiated; however, we were aware that there would be such requirements, and I think it's only fair to say while they did not dictate the noise levels of the DC-10, that they, in all fairness, had an influence in helping us and encouraging us to make the noise levels of the aircraft even quieter than we might otherwise have done.

The requirements are in three parts; there are three reference locations.

One, below the takeoff path, that we must meet a certain minimum noise level at 3.5 nautical miles from brake release as the aircraft climbs out after takeoff.

Second, that we must meet a certain minimum noise level on the sideline a quarter nautical mile to the side of the runway centerline after the aircraft lifts off after takeoff.

And third, a point below the approach path when the aircraft approaches on a 3° glide slope at a distance of 1 nautical mile from threshold.

This chart indicates the noise levels of the DC-10 compared to the certification requirement for takeoff at the 3.5-nautical mile distance; the units as discussed earlier are the effective perceived noise levels, EPNL, in units of EPNdB.

The requirement varies as a function of the certified takeoff gross weight of the airplane—the requirement varies from level of 93 to 108, depending upon the takeoff gross weight.

The DC-10 has the maximum certified takeoff gross weight of 430,000 pounds establishing a requirement of 105.6 EPNdB.

The level for the DC-10 as measured for our FAA certification trials is slightly less than 100 EPNdB, substantially below the requirement established by the FAA—and I might point out that this number represents the noise level of the aircraft during takeoff without making a noise abatement thrust reduction. There is not a tremendous difference in noise level with and without a thrust reduction, but we could probably again get another two EPNdB, with thrust reduction.

Turning to the sideline point, a quarter nautical mile from the runway centerline, again the units are the level—in this case it varies from 102 to 108 EPNdB. The level for the DC-10 is 96 compared to a requirement of 107, 11 EPNdB below the requirement established by the government.

I also have included another point on here—perhaps you can see it if I move this chair–for the DC-10 at 0.35 nautical mile from the brake release, or from brake release, I am sorry, to the side of the runway centerline, the reason being that some aircraft are required at the 0.35 mile, if the DC-10 were compared at that point, our level would be only the two EPNdB.

[Showing of next slide in series.]

The most difficult point for us, from a design standpoint, was the approach point. In this case the aircraft is going over the monitor at an altitude of only 370 feet. That is very close to the airplane, and we had a tough time getting there. The unit varies from 102 to 108 in terms of required level; the required level for the DC-10 is 107.

I will apologize for the chart, and also the paper and documentation; it shows our level is 105 EPNdB, when all the numbers finally cranked out of the computer, we ended up with a level of 106. You can't win them all, but we still came out below the requirement, and we included another point here, and that is that the regulation permits us to exceed the level at one of the three points, if we are well below the other, of the other points, we are well below as a consequence, we really could have had a level of 109.

So looking at it from that way we are still 3 dB below the level that would be permitted by the aircraft requirement. You might say we meet the requirement without the use of any tradeoffs.

[Showing of next slide in series.]

We will turn next to comparison with other aircraft.

Developing a fair comparison between the noise levels of two different aircraft is a formidable task.

There has been no universal agreement on the ground rules for making such comparisons and many different approaches may be used.

In some cases one aircraft may be quieter at one location while the other aircraft is quieter at a second location.

The noise at any location is a function of the noise generated by the aircraft propulsion system as it goes by and also of the distance between the aircraft and the location.

Many airport neighbors experience the noise of aircraft at a variety of distances from the aircraft depending on the flight climb profiles and flight patterns of the aircraft.

One of the major difficulties in a fair comparison is in selecting the appropriate aircraft for comparison.

The first aircraft selected for comparison with the DC-10 is the DC-8-61. This was done because these aircraft have approximately the same mission.

The noise levels of the DC-8-61 are typical of those of other current transports powered by four low-bypass-ratio turbofan engines, and the data are approximately applicable to that whole family of aircraft.

The comparison is made at the three locations used for FAA certification.

Figure 5 shows the relative noise levels of these two aircraft when both are operating at their maximum design weights.

Below the approach path the DC-10 is quieter than the current aircraft by 11.5 EPNdB.

On the sideline the DC-10 is 14 EPNdB quieter than the current aircraft, and below the takeoff path the DC-10 is 16 to 18 EPNdB quieter than the current aircraft depending on whether or not a thrust reduction is made.

The sideline comparison is made at 0.25 nautical mile for both aircraft even though the FAR part 36 sideline distance for four-engine aircraft is 0.35 nautical mile.

Both aircraft are also the same distance from the noise location for the approach data.

For the takeoff location the DC-10 has a greater climb capability, and the 16 to 18 EPNdB difference accrues from the fact that the DC-10 is basically quieter and also higher than the older four-engine aircraft.

These differences are especially significant in light of the fact that the DC–10 is heavier, carries a greater payload, and has engines which are rated at more than twice the thrust of those on the earlier jets.

Using the rule of thumb that a reduction of 10 PNdB or EPNdB constitutes a halving of the noisiness of the noise, these differences show that the DC–10 will be less than half as noisy and in most cases significantly less than half as noisy as the earlier jets.

For many people it is difficult to appreciate just what all these noise level differences mean without hearing the aircraft.

To some, their significance may be more easily understood by an examination of noise contours or lines of equal perceived noise level.

[Showing of next slide in series.]

This, presents contours of 100 PNdB during landing and takeoff of the same aircraft compared above.

These contours show how far a noise level of 100 PNdB extends into the airport neighborhood as the aircraft land and take off. Inside the contour the level would go above 100 PNdB.

Outside the contour the level would never be as high as 100 PNdB.

In the figure the observer is looking down from above the airport, and the aircraft is landing from the left on a straight-in approach.

The aircraft takes off to the right and climbs out with no turns. These contours are sometimes referred to as the noise footprints of the aircraft.

In terms of the area around the airport exposed to a level of 100 PNdB, it is dramatically smaller for the DC–10 than for the older jet.

The level of 100 PNdB was not selected as indicating any level or degree of acceptability. Similar reductions in contour size would be achieved by the DC–10 compared to the earlier aircraft if some other contour noise level had been selected.

The DC–10 will enter service very soon and the airport neighbors will be able to judge for themselves how its noise levels compare with those of current aircraft.

For this hearing perhaps the best way to convey the difference in noise levels between the DC–10 and current aircraft is by playing magnetic tape recordings made below the landing and takeoff paths.

We have obtained these tape recordings by going into the field; magnetic tape recordings were made beyond the end of airport runways for takeoffs and landings of the DC–8, the Boeing 727, and DC–10. The recordings have all been carefully calibrated so you will hear the proper relative level of the different aircraft.

Unfortunately, the equipment we have is not powerful enough to fill this large room with the levels which are equal to those that are actually experienced in a community.

I think that you can extract that, though, the difference in level is still appropriate, as you will hear on this tape.

The first tape will make a comparison between the DC–8 and the DC/10, first below the approach path—in this case, typical approach thrust between the two aircraft. The second part of the tape will be below the takeoff path at 3½ nautical miles—basically the same information we saw on the chart a little earlier.

With that background, now, I will play the tape. I will point to the aircraft you are hearing in each instant in time to keep you on board as to which one you are hearing.

TAPE RECORDING. The sounds you are about to hear were recorded directly beneath a McDonnell Douglas DC-8 and DC-10 during a landing approach.

Both aircraft are approximately 30 percent of takeoff thrust, and at an altitude of 400 feet.

Now the comparison; the DC-8, followed by the DC-10.

[Flyover noise demonstration.]

TAPE RECORDING: Next we will compare the maximum noise level portion of the normal landing approach flyovers we have just heard: [Flyover noise demonstration.]

TAPE RECORDING. Next we will compare DC-8 and DC-10 takeoff noise.

This comparison represents the noise that would be heard by the airport neighbors at a location 3.5 nautical miles from brake release.

The aircraft are on a maximum takeoff gross weight profile; these operating conditions correspond approximately to the FAA certification requirements for takeoff noise. Now, the comparison; first the DC-8, and then the DC-10: [Flyover noise demonstration.]

TAPE RECORDING. Now, we will compare the maximum noise level portion of the takeoff flyovers we have just heard.

First the DC-8, and then the DC-10: [Flyover noise demonstration.]

Mr. McPIKE. While the DC-10 will be operating alongside the current four-engine jets at many airports it will also be servicing smaller airports where these large aircraft do not operate.

The question then becomes how do the sound levels of the DC-10 compare with those of the DC-9, the 727 and the 737.

Details of the differences between the DC-10 and these two- and three-engine transports are included in the documentation submitted with this testimony.

These data show that the DC-10 is substantially quieter than the current aircraft. To provide an example a second demonstration tape compares the noise levels of the DC-10 with those of the 727-100.

The noise of this aircraft is familiar to most airport neighbors and has frequently been used as a reference noise for those airports which are not serviced by the large jets.

The example is illustrated in figure 7 which compares the two aircraft on a typical mission basis. The example was prepared as part of a study for LaGuardia Airport in New York and the mission was a New York to Chicago flight of 675 nautical miles distance.

The DC-10 is 5 to 6 PNdB quieter than the current three-engine fan jet below the approach path and 7 to 8 PNdB quieter below the takeoff path.

The comparison location for takeoff is 3.0 statute miles from brake release. On the demonstration tape this distance is 2.9 statute miles which is the distance to a noise monitor location for one of the runways at LaGuardia Airport.

Now I'll play the tape recording.

TAPE RECORDING. The flyover noise of the DC-10 during landing and takeoff will be compared with that of the Boeing 727.

The first comparison is on landing approach; both aircraft are at approximately 45 percent of takeoff thrust and at an altitude of 300 feet.

Now the comparison; the 727, followed by the DC-10: [Flyover noise demonstration.]

TAPE RECORDING. Now, let's compare the maximum noise level portions of these flyovers: [Flyover noise demonstration.]

TAPE RECORDING. Next we will compare 727 and DC–10 takeoff noise.

This comparison represents the noise that would be heard by the airport neighbors at a location 2.9 statute miles from brake release. Both aircraft are at 100 percent of takeoff thrust.

Now the comparison, the 727 followed by the DC–10: [Flyover noise demonstration.]

TAPE RECORDING. Now, let's compare the maximum noise level portion of these flyovers: [Flyover noise demonstration.]

Mr. McPIKE. If we could have the lights again, I think that's all the slides I brought.

As you can tell from these tapes the noise levels of the DC–10 represent a very substantial improvement compared to the earlier aircraft.

We have conducted actual demonstrations with the DC–10 on quite a number of occasions and almost without exception people have indicated that the reduced noise of the aircraft is even more impressive than indicated on the tape recordings.

The low noise levels of the DC–10 raise the very obvious question—"Can this technology be applied to the current aircraft to make them as quiet as the DC–10?"

The following comments are included in anticipation of that question:

First, the technology is not currently available to achieve such low levels by modifying the existing low bypass ratio turbofan engines which power most of the current fleet.

While technology is available to reduce the turbomachinery noise of these engines by nacelle treatments, no practical methods have been demonstrated to achieve meaningful reductions in the jet exhaust noise of these engines.

Further research efforts might develop such technology but it is not available now.

Second, the current fleet could be made much quieter with a new high bypass ratio turbofan engine using the same technology as in the DC–10. However, there is no such engine available in the thrust class that would be necessary for the current aircraft.

In fact, no such engine is being developed at the present time. Even if development of such an engine were to start immediately it would be years before it could be available.

It might well be that if such an engine were developed it would not be practical to install it on the current aircraft, many of which would be close to retirement by the time the engine became available.

The development of such an engine would, of course, because it would be superior to current engines, encourage the development of new aircraft which could use it.

Thus, efforts to develop new jet exhaust noise suppression techniques and to develop a new technology, high bypass ratio turbofan engine in the 20,000-pound-thrust class should be encouraged for the eventual alleviation of the airport noise problem.

While the developments applied to achieve low noise levels for the DC–10 cannot be readily applied to the aircraft in the current fleet, the introduction of the DC–10 should have a significant impact on the airport neighborhood noise problem.

It will finally demonstrate to the airport neighbor that progress is being made and that he can look forward to lower noise levels as more DC–10's enter service and the older noisier aircraft are gradually phased out.

This concludes my testimony, and I thank you for the opportunity to present it.

Dr. **MEYER**. Thank you very much, Mr. McPike, for that extremely useful demonstration, along with your presentation. Panel?

Professor **KERREBROCK**. Just one question. You know, the philosophy that was espoused in FAR 36 was that once you had established noise regulations which were technologically feasible and economically practical and so on, and we seem to have the happy circumstance here now that the DC–10 indeed does better than it's required to by FAR 36. Does this mean that it's too conservative a regulation?

Mr. **MCPIKE**. I would answer that this way: we barely made it, and for a long time we were pretty nervous about the approach point.

Professor **KERREBROCK**. But now you are very happy?

Mr. **MCPIKE**. We are pleased that we did make it, yes. It would appear that, yes, the level for this aircraft, or the requirement for this aircraft could have been lower, but hindsight is often better than foresight, and we were not at all that confident that we could have levels which are this low at the time FAR 36 came into being.

Also remember this is a specific type of aircraft. There are, will be other types of aircraft which will not necessarily be able to meet levels which are quite this low, and remember that the requirement had to be such that it would encompass all of the aircraft types, so perhaps it was in some respects a bit conservative—not in all respects. Did I answer your question?

Professor **KERREBROCK**. Well, not quite, because this is the long-range version of the DC–10, as I understand it.

Mr. **MCPIKE**. This is a long-range domestic version of the DC–10.

Professor **KERREBROCK**. Does Douglas—does that mean that Douglas has plans for increasing the gross weight, perhaps using up this cushion?

Mr. **MCPIKE**. No; we will have future versions of the DC–10. In fact, we have, very definitely we are building in the future a later version of the DC–10 which will use the same general engine and will have the same or greater sound suppression built into them, and will have the same general noise characteristics, but they are—they do have higher gross weights, and have slightly different requirements and slightly different noise levels.

We are not going back to the noise levels of the old aircraft, but there will be some plus or minus variations associated with it.

Professor **PLAGER**. Mr. McPike, I don't think it's useful at this date in time to start trying to fix the blame or recriminations about why we have the problem we do, but it might be helpful if you would comment for us on where the handles are on this problem.

We heard this morning from the engine manufacturer who indicated that they have been able to, and deal with this problem, and apparently have been working on it for a good while, and apparently had military applications back prior to the middle 1950's, as I understand it, and yet here we are in 1971 first coming out with an aircraft that really addresses itself to this problem.

Now, what—where is the problem? Where is the responsibility, not in terms of recrimination, again, but in terms of dealing with this problem in the future at State and Federal levels.

To whom do we turn to find out where the responsibility is between the engine manufacturer, the airframe-aircraft manufacturer, the operator—who is it who is in the position to say, "I want a quieter aircraft"? Who bears that?

Mr. McPike. Well, sir, I believe we all bear that responsibility. The government must make a choice. It must establish either a requirement that we can meet or a requirement that we can't meet.

Professor Plager. Well, why do we have to depend on the government? Isn't there some responsibility in the hands of the manufacturers and the airframe manufacturers to deal with a major social problem without waiting for "big brother" to come and breathe down his back?

Mr. McPike. My comment there would be that there is no question from my level straight through to the very top of our company and our corporation, the attitude that if we can come out with a product that is quieter than our competition, there is no doubt whatsoever that we can outsell our competition hands down.

In fact, I will go the other way: We know that if we come out with a product that is not as quiet as our competition, that we cannot sell that product, so what you are asking, believe me, is built into the industry, without question

Professor Plager. It has not apparently been built in in the prior years, witness the DC-8 and other noisy demonstrations, but you are saying it now seems to be emerging; is that really the point?

Mr. McPike. I can't really agree with you on the first statement, sir, because the DC-8 utilized technology we had at the time; the DC-9 utilized the technology we had at the time, and now the DC-10 has utilized the technology we had at the time.

Professor Plager. Except that you asked for that technology, did you not—didn't you ask for improvement in the state of the art when you said to GE, "build me an engine that will be quieter"?

Mr. McPike. Yes, sir; believe me, we asked for that before, except I guess the basic problem is there was no new engine available at the time the DC-8 came out, the only thing available was a military engine, some noise improvements; Pratt and Whitney developed a so-called hush kit for that engine which made it substantially better than it could have been.

Again, that was the available state of the art at the time, and was cranked into that engine.

Professor **Plager**. Can your company accelerate the work of the engine manufacturers by asking for more all the time?

Mr. **McPike**. I think we have ground them up to the wall probably about as—in as strenuous a manner as we can. We, of course, must consider what is possible, and we don't want to demand something of them that we know they can't accomplish, but believe me, anything that we feel that they can accomplish, we certainly will demand and require from them. Thank you.

Dr. **Meyer**. Thank you very much, sir. That was a most useful dialog between you and the panel, which reflects both the interest and need. At this time, having heard from the engine manufacturer, from the airline operator, from the airframe, and aerospace industry, I would like to ask a representative of the Air Transport Association of America, the synthesis of the various elements of the air transport community, Mr. William Becker, if he would please come forward and give us a presentation as to how the industry, as a group, looks at the noise problem. Glad to see you, Mr. Becker, and we look forward to your testimony.

STATEMENT OF WILLIAM B. BECKER, AIR TRANSPORT ASSOCIATION

Mr. **Becker**. I am William B. Becker, assistant vice president of operations of the Air Transport Association, and members of our organization are the scheduled certificated airlines—substantially all of them—not all of them. I have a summary of my paper here which I will read, and then go into some more detail.

The airline industry, in the act of providing safe, dependable, and fast air transportation also creates public annoyance in the form of noise.

Our industry recognizes our obligation to the community and for many years has devoted time, talent, and money, to the reduction of noise.

The results vary from impressive to spotty. The reasons for this variation helps to define the nature of the problem: First, we are dealing with a high degree of technological complexity; second, there is a division of responsibility that sometimes stalls meaningful solutions; and third, we are, at times, caught in the middle of a clash between opposing community and public needs—often the need for environmental quality is expressed in terms that would effectively preclude our meeting the other public need—for safe, dependable air transportation.

A brief look at the problem of aircraft noise will illustrate these points: Let me say at the outset that this is not simply a matter of reducing noise, but rather of reducing the annoyance to the community created by aircraft noise.

We are not dealing just with the amount of noise produced by jet engines, but rather with the effect produced by this noise on people living near airports and the flightpaths that lead to and from airports.

So we must work on changing the character of the noise as well as the quantity. Moreover, as studies by the National Aeronautics and Space Administration have shown, reaction to the same noise exposure varies with individuals and in fact communities.

It is this subjective element that complicates efforts to determine whether a given noise reduction program will in fact have any measurable effect on reducing noise annoyance.

Three approaches to jet noise abatement have been recognized: (1) Reduction of noise at the source—viz, design of the aircraft and engine for quietness; (2) adjustments in method of flight—e.g., reduced-power takeoffs; (3) compatible land use around airports.

It is evident that governmental noise-control measures dealing with engine-airframe design, or with methods of flight, must be by the National Government, which is charged with the exclusive regulation of air safety, flight control, and the use of airspace. The courts have so held.

It is equally apparent that land use measure for noise alleviation can be carried out only by State and local governments, or communities, which alone possess the requisite legal authority—possibly aided by financial assistance from the Federal Government.

These conclusions are implicit in the very nature of our national air transport system.

From the beginning Congress has recognized the necessity of unified national control over the navigable airspace and the regulation of flight.

In the Federal Aviation Act of 1958, Congress gave the FAA "unquestionable authority for all aspects of airspace management" as well as "plenary authority in the matter of air traffic rules"—S. Rept. No. 1811, 85th Congress, second session, 1958.

In 1968, Congress amended the Aviation Act expressly "to require aircraft noise abatement regulations" by the FAA—82 Stat. 395, Public Law 90–41, July 21, 1968.

In fact, Federal regulation of air traffic and the navigable airspace has been virtually pervasive. These actions by Congress have been sustained as a lawful exercise of Federal power by both State and Federal courts.

It is a tribute to the foresight of Congress in establishing unified national control of air traffic, and to the manner in which the FAA has carried out its mandate of exclusive regulation of air flight, that the safety record of air carriers in the United States is the best of any mode of public transportation—by a wide margin—culminating in the year 1970 with no persons killed, for the first time in a calendar year; domestically there were two persons killed—this is U.S. air carriers, in an air accident outside of the domestic part of the United States. That is the best record we have ever had, and you can't beat it. We would like to make it better, because we have close calls, in addition.

In fact, only by reason of such a safety record has it been possible for the air transport system to have achieved its extraordinary public acceptance and rate of growth.

It is this growth of air transportation which has resulted in the expansion of industry, and the creation of whole new industries.

It is unfortunate that part of the price for this extraordinary progress has been annoyance to airport neighbors from the noise of jet aircraft.

The problem of aircraft noise is not to be minimized. At the same time, as expressed by former Secretary of Transportation Boyd in the congressional aircraft noise hearings in 1968, "It would be well to keep this whole business in some perspective."

The FAA, for example, in its Report on The Aircraft/Airport Noise Problem and Federal Government Policy, points out that:

> The airport noise problem has continued to grow during the last decade not only because jet aircraft has been and still are inherently noisy, but also because larger numbers of people choose to live and work near airports where they are subject to noise.

Judge John F. Dooling, Jr., in his opinion in 1967 in *American Airlines, Inc., et al.* v. *Town of Hempstead, et al.* denying enforcement of the Hempstead, N.Y., local ordinance against jet noise, has made a similar observation:

> The dimensions of the noise problem cannot be minimized. It is, however, one of the manifold of environmental problems that press on a society in which the pace of industrialization steadily outstrips the capacity to deal with its modification of the total environment of urban and suburban existence.
>
> Perhaps the aircraft noise problem differs in that it appears to be unavoidable, in the present state of technical development, and not a consequence of the failure to take feasible precautions or to provide practical remedies.

Let's look at operating procedures—before I go into that, might I indicate that at O'Hare here in 1970, for example, we are talking about the economic aspects and need for aviation versus the noise annoyance which is there.

In 1970 there were 30 million passengers who went in and out of O'Hare Airport. During that same year there were three-quarters of a million tons of mail and cargo that went in and out of O'Hare Airport.

About and during that same year there were nearly 600,000 total operations—that is, arriving airplanes and departing airplanes at O'Hare Airport.

Now, let's go to operating procedures, takeoff, and landing profiles.

The airlines have expended vast amounts of money and effort in seeking noise remedies. As early as 1952, and before the advent of jets, the airlines and their pilots developed special takeoff and landing procedures for noise abatement. This dealt with the piston airplanes, the DC-3's right on up to the DC-7's.

These procedures were costly and difficult, but they produced significant reductions in noise exposure.

Before the jet transport was introduced in daily service, the airlines realized that noise problems would increase in scope and magnitude as time went on.

Thus, at that time, takeoff and landing noise abatement procedures for jet transports were established. These have continually been reviewed to provide the best results commensurate with safety of operation.

In doing so the airlines have accepted certain alterations to the optimum safe takeoff procedures for the sole purpose of reducing noise on the ground. Takeoff profiles have been altered by: (1) Delayed flat retraction and use of minimum speeds, (2) changes in power management—early reductions, (3) making turns at relatively low speeds and altitudes in initial climbouts, (4) reduced overall climbout speed schedules, (5) reduced rates of climb, and (6) time spent in initial climbout configuration has been extended.

The airlines are looking at—and you will probably hear from Paul Soderland of some of the things that Northwest has looked at, and others have—North Central has looked at some procedures; American is looking at some procedures, and Delta has looked at some procedures to try them out.

The first thing, though, is safety; we cannot compromise safety. And there are some differences of opinion between competent piloting personnel of the scheduled airlines as to what is safe and what is not safe, and what is a good profile and what is a bad profile.

This is good. If we all did it the same way, it would be like Russia, and it might be all wrong.

Any further departures from the most desirable takeoff techniques would, in the opinion of the airlines, constitute an unacceptable compromise with safety in today's transport aircraft.

With regard to noise abatement approach procedures, the airlines have agreed under VFR weather condition to approach the airports at 1,500 feet or above as long as possible before descending to land.

For IFR operations, the standard glidepath which the U.S. airlines and Government agencies have agreed upon over the years, as the best from a safety and operational standpoint, has been a 2.5° approach angle to touchdown.

This accommodates the characteristics of present-day jet transport aircraft with respect to the requirements of an acceptable safe rate of descent, early establishment of the airplane in a "steady state," and assurance of spun-up engines to provide go-around or missed-approach capability.

Glide slopes of up to 3° have been accepted by the airlines in conjunction with the lowest permissible landing weather minimums for noise abatement purposes.

At the moment I think of some 300—I am not sure of the number—312 ILS glideslopes. I think there are 93 at 3°. The rest of them run—and some, one is over 3°, the rest of them run between 2.5° and on up to 3°.

The second area we are, we have operating procedures, we use preferential runways.

Preferential runways have been used since the early fifties in an effort to reduce the number of airline flights operating over populated areas.

Normally transport aircraft, for safety purposes, use the runway most directly with the wind. In order to avoid departure over concentrated populated areas, the airlines are accepting "preferred runways" with crosswinds up to 15 knots and 90° to the runway heading.

As has been pointed out earlier regarding takeoff and landing noise abatement procedures, safety margins have been reduced somewhat through the acceptance of less than optimum procedures.

Compliance at the same time with preferential runway requirements can further decrease these safety margins.

In addition, the use of preferential runway system reduces airport capacity, frequently to the extent of imposing undue hardships upon the persons using the airline service and thus the communities served, and severe economic penalty upon the air carriers.

For example, at Kennedy in New York it is estimated that it reduces the capacity of that airport by 50 percent. In some cases, depending on the wind, it's as high as 75 percent.

Then, the second, the third way is having air tracks over the sea, or the rivers, or over unpopulated areas, but when you put it over, or get it away from the populated area to this unpopulated area you find there are more people there than you thought, because you get the noise complaints from that area.

In addition, special ground tracks for landing and takeoffs, routing the aircraft over water courses, the sea, and away from residential and other noncompatible land areas have been established.

Of necessity, these must vary from airport to airport. Efforts are continuing on such a basis, in cooperation with the FAA, to find additional means of safely landing and taking off without causing as much noise annoyance.

One thing is clear. While special flight procedures have produced significant noise reductions, we are about at the end of that particular road at many major airports, at least with existing aircraft.

Airlines efforts at noise alleviation have covered other fronts. The industry expended more than $50 million in developing noise suppressors for the early jet engine.

By 1965 the airlines had invested $150 million in putting these noise suppressors on their jet fleets. Over and above this $200 million installation cost, the expense of operating the engine noise suppressors amounted to a substantial sum per aircraft annually; their estimates have been it's about $10,000 an airplane annually.

But there should be no illusions as to the prospects of any dramatic solutions from any new device, technology, or procedure.

True, each new jet aircraft which has been introduced has been quieter than its predecessors—and I might say, quieter than the piston engines; a lot of us have forgotten the DC-7 and the Constellation, but those airplanes, when they took off, made a footprint such as Mickey had, much larger than 100 PNdB, the footprint would be larger than it was for the DC-8 because they were slow climbing, and it took so long to get there, and a lot of people forget that.

The 707 straight jet then came along; it's footprint was smaller, the 707 had a smaller footprint than a DC–7. The fan jets came along with a smaller footprint, and we had the JT8 powered airplanes with 727 dB, the 727–2 engine, three-engine airplane which automatically make them smaller as far as footprints are concerned, and we now have the GE engine on the DC–10, again quieter.

You will also have an engine on the L–1011 which will make that on the order of the same quietness of the DC–10. As I understand it, it's quieter in some respects in some measuring points, and not as quiet at other measuring points. This may tend to answer your question as to why can't we rewrite the rules and say let's go back to the DC–10; what if you hit the DC–10, you would knock out the L–1011; if you met the L–1011, you owuld knock out the DC–10, it's that shaky.

However, there are clear limits on the prospective noise alleviation from engine and airframe design and hardware.

Former Secretary of Transportation Alan Boyd, in the Senate noise hearings in 1968 stated:

> Let me make it very clear that the present technology which we have to produce a quieter engine, and that which we believe will be available within the short-range future, will not solve the aircraft noise problem.

To this, former Secretary Boyd added, significantly, "actually, as you point out, there is no such thing as an answer to aircraft noise."

What Boyd undoubtedly meant is that, whatever degree of engine noise reduction might be achieved, some complaints will still exist.

Exhaustive studies in the United States and abroad have shown that, no matter how much the noise level is reduced, there will remain an implacable "hard core of complainants," amounting to approximately one-third of the population near an airport.

Now, there has been much work done on the—some work that has been referred to, the NASA quiet engine, and for those who are not aware, I want to make it abundantly plain that the NASA so-called quiet engine as it comes off, and is finally contracted, is what I call a steel and concrete engine. You can't put it on an airplane, it's a research tool, and they will bring the fan noise—it's aimed at the fan noise—they will bring the fan noise down to 90 PNdB, but the engine noise will be at 100 PNdB because the jet core noise—this is the report from NASA, the jet core noise is still there. They haven't been working on that, and this is the kind of area where we think, and I think others have indicated a lot more work needs to be done on the jet core noise if we are really going to make a substantial reduction that will be acceptable, or meaningful to the airport neighbor.

The limitations on prospective noise alleviation from engine developments, particularly in the case of existing aircraft, were acknowledged in the Langley, Va., briefings by NASA on the status of its research projects on jet noise alleviation through engine nacelle modification and treatment.

Moreover, it is apparent that much of the Federal Government's engine noise research now being performed is essentially experimental.

For example, the publicized NASA quiet engine project aims to produce by 1975, at a cost of $50 million, a so-called quiet engine.

However, even if achieved, the quiet engine is calculated to have a service life of only 50 hours. To develop such an engine for actual production and use would require a much longer service life.

There is not even an estimate as to how long it would take to develop such a working engine, even if it could be made.

The objective of compatible land use is, of course, to keep at a minimum the number of residences and places of public assembly that are close to the touchdown and takeoff points at public airports.

In contrast to proposals such as local maximum noise regulations, which the courts have rejected because of their inevitable interference with exclusive Federal flight control, compatible land use measures are primarily the concern of local, community, and State governments.

In considering compatible land use, and indeed the very origins of the noise problem, it must be borne in mind that most existing major airports were located many years ago, either by the community or by the military during World War II—and subsequently converted to civilian use at the request of the locality.

A 1966 study found that 57 of the airports serving the 61 largest cities in the United States were established prior to 1950, and that there was naturally great reluctance to abandon them, even though they had frequently become almost surrounded by urban development.

Since the cities want air service, and the carriers must use the city's airport wherever it is found, the circumstance of where an existing airport was originally located is really at the heart of the noise problem.

This is true in Los Angeles; it's true in J.F.K. I used to fly around—Professor Plager has heard me talk on this before, out of Floyd Bennett, which they are closing up now, and want to put some houses on, and at the time during the war there was no J.F.K.

It was Jamaica Bay, and at the time they were dredging it out of the bottom of the bay and making runways, and making a place to build an airport, there weren't any houses around except for a few such places as Hempstead, Cedarhurst, within miles of that place. Right now they are right up against the fence in many cases.

The location of the airport also bears heavily on the practicability of compatible land use measures.

Obviously, the practical and legal problem is quite different when one is dealing with an approach zone that has already built up, on the one hand, and an approach zone that consists of vacant or industrial land on the other.

In the former case, the cost of redeveloping a whole area, plus the desire of people to remain where they are—and experience indicates that in spite of the noise, many people do not want to move—make it difficult to accomplish compatible land use, either by eminent domain or by zoning.

On the other hand, the jet noise problem cannot be looked at solely from the viewpoint of existing built-up airports, such as LaGuardia or J.F.K. or Los Angeles International or other established airports.

For the future as well as the present it is crucial to preserve open spaces, and for emerging airports—of which there are going to be many—to locate them properly from the outset, with adequate, permanent noise-buffer zones in addition to the obstruction clear zones needed for safety purposes.

It is worth noting, in this connection, that contrary to the oftheard argument that airport noise has depressed the market value of particular parcels near some airports, the conclusions of actual studies are that such property values are far more likely to increase in value overall.

In fact, numerous local land use studies indicate that overall, taking all property uses into account, property values in a jet airport's neighborhood tend to follow the same trends as other property in the area not influenced by the airport.

Certainly it is undeniable that land developers consistently seek land near airports, and it follows inexorably that a new airport will inspire extensive construction around it.

There is much work to be done to understand the noise generated from jet engines; i.e., the sources, propagation, attenuation, effects on people, et cetera.

The aircraft and the engine manufacturers spend between $15 and $20 million each year in an effort to find answers to these noise problems.

The Federal Government spends an equal amount. Nevertheless, we have much, much more to learn before we can expect to provide airport neighbors with meaningful relief from aircraft noise.

The airline industry has within the past few months made strong pleas to the administration and Congress to undertake the necessary research and development regarding aircraft noise.

A summary of the industry's recommendations are included here for your record.

In conclusion, the industry will continue to do what it can in seeking a breakthrough in reduction in noise at the source.

The airlines and their pilots, as in the past, cooperating with Federal and local agencies will develop and follow flight routes, climbout or descent paths, and operating procedures that minimize the exposure of people to the noise of jet aircraft.

However, it does not help reduce noise annoyance to develop and prescribe preferred noise abatement routes over least populated areas if there is no way of preventing residential building in these very areas where the noise is supposed to be concentrated.

Therefore, we ask the communities affected by aircraft noise to recognize and accept their responsibility for requiring land use compatible with noise exposure under flight paths used for landing and takeoff from nearby airports.

Meaningful reduction in aircraft noise annoyance cannot be achieved without this local community action.

And, finally, a much stronger Federal aircraft noise research and development program needs the support of all of us interested in aircraft noise abatement.

Dr. MEYER. That attachment will be included with the record.[*] Thank you very much for one of your usual stimulating discussions, Mr. Becker. Panel?

Professor KERREBROCK. One suggestion that has been made, and, in fact, experimentally implemented elsewhere in the United States is that a tax be imposed on aircraft noise. How would you view this, that a charge be levied against the airline, in accordance with the amount of noise impact it imposes on the community?

Mr. BECKER. Well, that would be the same as increasing the fares, really, because if the airlines were taxed, they would pass it onto the passenger—they would have to, because otherwise they would be broke. They are going broke now. That is one way to do it, but I think it's wrong, completely, if you do it only that way.

Let's say we have no airline service into California if their existing law goes into effect and becomes law in December, and is enforced, within 2 years, it would be—1973 it would be enforced on the 80 CNEL, and as Frank Kolk indicated this morning, according to the Los Angeles port—I will get to your question in a minute——

Professor KERREBROCK. OK.

Mr. BECKER. The port authority, Los Angeles Port Authority people have reduced—would have to reduce the operations into the airport by 80 percent.

We have made another study which comes about like that, it's a paper study, and we made a presentation to some of the legislators in California pointing this up within the last month, but let's assume that goes into effect and airports just aren't available.

In case of earthquake, pestilence, fire, what have you, I think people want to have aviation because they can get to things quicker than any other means, relief, and I think the general public, other than the passenger or the person who pays the freight for cargo, have an interest in aviation being in existence, so it shouldn't all fall on the passenger or on the person who pays the freight for the cargo, or for the mail.

There is an area—I don't know how much a percentage that should be picked up by the general taxpayer—I tried to answer your question. I may have—I may have—it may have escaped me, but that is the best I can do.

Professor KERREBROCK. No—well, yes; it's a partial answer, but I guess you put it more directly, I would ask how you would use such a tax on noise, perhaps as an alternative to Federal regulations which set absolute limits.

Mr. BECKER. Well, see, the Federal Government, I don't think it makes a lot of difference. The Federal Government is responsible for the airlines' economic well being; through the Civil Aeronautics Board regulations they have to raise or lower their tariffs, or tell whether you have competition or don't have competition on the routes. The Federal Government has that control today. We are a fully regulated industry.

Professor KERREBROCK. Well, it would give more flexibility for entrepreneurship, let's say.

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[*] This material is on file at the Office of Noise Abatement and Control.

Mr. Becker. On behalf of the airlines.

Professor Kerrebrock. Yes.

Mr. Becker. Well, we have to buy the equipment the manufacturers make. We ask that it be as quiet as it can be. In fact, we have asked for some noise limits to be a little quieter than they are, but you have the economic reasonableness and the technical feasibility that tie in with this.

Mr. Martin. Bill, in the highway area there is a tax on gasoline that is used for developing roads.

Mr. Becker. Right.

Mr. Martin. What would you think the feeling would be along the lines of possible revenue coming by the use of the passenger via a tax to develop feature airports and compatible—take into account all the new ideas, with zoning and everything else?

Mr. Becker. Well, to a big degree that is in being, Hank, because we have this trust fund business which is $250 million a year supposed to go toward airport development.

The question is, I guess, would this go into compitable land usage. I don't—I think the law would have to be changed before it was permissible.

Dr. Meyer. We will take note of the thought, which is a very interesting one, of whether there should be some way of approaching the problems of research that you mentioned in a systematic order.

Mr. Becker. Right.

Dr. Meyer. Looking at the air transportation system, especially the ground use——

Mr. Becker. Right.

Dr. Meyer. People flying on the airplane have to get to the airport, and sometimes from many miles away, and they are riding automobiles, so we have to look at this in a systematic manner. It seems the proposal here is one that we must look at, it has been brought up at the hearings, and I can assure you that in our studies of this problem we will take a closer look at it. It's a very good suggestion.

Mr. Becker. Dr. Meyer, on the R. & D. research, the existing same trust fund, as far as aviation concerns makes available x million dollars–I think it's $50 million—it can be higher—for aeronautical research. This can include, and does include noise research, of last year the FAA had about $3.5 million, which is really peanuts. We are nickel and dime in this research business, and the NASA had, I think, on the order of $15 to $20 million—I have forgotten which—the program that we submitted to you would cost at least $30 million a year. We have made this recommendation to the Appropriation, Transportation Subcommittee of the Appropriations Committee of the House, but they didn't accept it.

Dr. Meyer. Well, I am not suggesting this—it's often dangerous to play with these numbers in a public hearing, but I think I heard you say 30 million passengers embark and disembark at O'Hare terminal last year; at a dollar-a-head that would have paid for your research program.

Mr. Becker. That's right.

Dr. Meyer. Thank you, sir.

Mr. HINTON. Mr. Becker, I would like to just say I agree very strongly with two points that you made; namely, the fact that we shouldn't let the problem at existing airports—you mentioned LaGuardia, J.F.K., or Los Angeles dictate our actions, and say we can't take steps and prevent the problem from occurring at new airports.

And second, you said that the route cause of the aircraft noise problem is the location of airports in proximity of residential development around them.

We have all the noise in the world, and if there was no one there to be exposed to it, it would not be a problem per se.

I would like to ask you a question, and this is in connection with recent information that I have, that the airlines are about to act in concert through the ATA operation committee, which you are a member of, to see, in the absence of continued FAA delay, in adopting operating procedure, adopt an optimized takeoff noise abatement procedure.

I wonder if you have any timetable that you could tell us about for implementation.

Mr. BECKER. Well, as you know, the airlines have, and working with the pilots, put together some—it must be 4 years ago now—what was considered, then it was changed a little bit this last January, a standard noise abatement takeoff procedure for use at those places where you have noise problems, using that particular one on a west takeoff over Los Angeles, because you are over the ocean very quick, nobody is out there that amounts to anything, so they already have one, so the FAA then, last April, spent a month's time at their research center, flight research center at Newark—at Atlantic City, N.J., testing several other takeoff and landing procedures for noise abatement purposes, with noise monitoring meters and everything, using four aircraft, the DC–9, the 727—I think it was the 707–720 and I have forgotten what the other one was, and the reports aren't in on that yet, and we are anxious to find out just how those stacked up.

We did have some airline people participate in those. The only difficulty with those tests were they were more aimed at what the noise was, and not whether they were operationally acceptable under all weather conditions, and whatever we do, we have got to be able to do the same for visual flight rules and under bad weather conditions, they have to be standard.

Now, people will quarrel with that. I think that most of those people are not pilot types, because we have to formulate our takeoff and landing procedures around what I choose to call the lowest common denominator pilot and not around the best pilot.

Mr. HINTON. Well, Mr. Becker, you and I are both pilots, and we know what needs to be done in certain areas.

Now, it seems to me if you are going to standardize a noise abatement procedure, you would use it everywhere, whether or not it was necessary, because of an ocean being present or not, you would just do it for standardization purposes.

Mr. BECKER. Well——

Mr. HINTON. You obviously can't operate differently at every place you fly.

Mr. **Becker**. As I said, Lloyd, when you do a noise abatement procedure, you don't fly it the safest way it can be flown, so there would probably be two methods—the safest way to be flown, which is all the way to the forward, get your speed up and hold it, and get altitude.

Mr. **Hinton**. I disagree with you on this point, but——

Mr. **Becker**. Second, for noise, though, we ought to have one procedure.

Now, there are some airlines that are willing to go the other way and do just the noise procedure, I agree with you.

Mr. **Hinton**. Well, I feel that there is no denegation of safety with an appropriate noise procedure, and I guess it has been, is being demonstrated everyday, and I would just like to see—I would like to know if you can tell us, give us, some time when the airlines would, as a group, implement optimized takeoff procedures.

Mr. **Becker**. No way; no way.

Mr. **Hinton**. OK; thank you.

Professor **Plager**. Mr. Becker, you and I have——

Mr. **Becker**. Discussed this before.

Professor **Plager**. Discussed this before the public hearing, so I don't think it useful to rehash, for the benefit of this group, the whole debate.

I do think it might be useful to put a question to you, but let me preface the question with a couple of comments from your statement.

We are zeroing in again on this question of—well, I am looking at the question of operational procedures as distinct from what can be done about noise at the source, and as distinct from the land use planning problem, the three legs upon which this issue generally is described to be standing.

Let's talk about operational procedures. In your statement here, and in your statements before the public hearings in Illinois on this same question, you again made the statement that the National Government is charged with the exclusive regulation of flight control and the use of airspace.

Now, you cite, as so often done, a phrase or two from a Senate report. Nobody seems to cite much in the way of Federal legislation, but they do cite a phrase or two from various Senate reports, which, in fact, are not the law. They are some indication of the intent of the committee that dealt with the statute, but that is not congressional action, but put that aside.

Succinctly stated, I don't believe, Mr. Becker, that it is true that the Federal Government has exclusive jurisdiction over the entire array of operational procedures.

I don't believe the States believe that, Mr. Becker. I don't believe the State of California believes it. I don't believe the State of Illinois or the State of New York, or the other big States that have thousands of people clammering for some action being taken here and not getting that action, I don't believe they believe it.

I am not even sure the Federal Government believes it, because if you read carefully the introductory sections to FAR part 36, which unhappily I don't have, I can't find my copy of it, I think you will find language in there indicating that even with a guard to the certification of noise sources, the FAA has language in there saying these are not certifications that have to be bought by the airport proprietors. They are not certifications that guarantee to meet local requirements, and indeed there is a disclaimer that, in effect, says local proprietors and problems have to take it from there.

Well, I guess what I am asking is I gather from earlier comments from some of the airlines themselves that they are more likely to accept a cooperative attitude with the State should the States cease to move to encourage operational procedures that deal with this problem, and the question I would simply put to you is what attitude can we expect from the ATA, whom you represent here, when States move into this area, which they are indeed doing; can we expect a cooperative, supportive attitude from the Air Transportation Association to come to grips with this problem, and to deal with effective regulatory programs, or can we expect an attitude in which the ATA will say, "We are not going to cooperate with you at all because you have no right to do any of this."

Mr. BECKER. First I will start at the beginning of the conversation; I will cite you some sections of the act where the law says what it says.

Professor PLAGER. All right.

Mr. BECKER. Section 307(c)—I am dealing with flight control and use of airspace that was put in there in 1958.

Professor PLAGER. I am not here talking about CAB rules.

Mr. BECKER. I am not talking about CAB rules. I am talking about air safety flight control, use of airspace—that is the Administrator's—title 3 of the act—is the Administrator of the Federal Aviation Agency's bailiwick; title 4 is the civil aeronautics bailiwick; title 3 is what I am talking about.

I am talking about air traffic rules and safety. If you want to talk about title 6, pilot certification, not airport—yes, airport certification——

Professor PLAGER. No. I want to talk about preferential runways, and I want to talk about——

Mr. BECKER. Preferential runways.

Professor PLAGER. Thrust on takeoffs.

Mr. BECKER. Now you are in two different areas. If you want to talk about runways, we are talking about section 307(c).

If we are talking about reduced takeoff procedures, we are talking about title 6.

Professor PLAGER. Is it your contention—do I understand your contention to be that the airport proprietors and the municipalities and the States have no jurisdiction over questions like preferential runways?

Mr. BECKER. I am going to get to that.

Professor PLAGER. Okay.

Mr. BECKER. I will give you another citation where the law says—and I read it—section 611, which was put into the act in 1968 by Public Law 90-41 says the Congress requires aircraft noise abatement regulations by the FAA. "Requires," the word requires is in there.

Professor PLAGER. That doesn't necessarily mean nobody else is.

Mr. BECKER. No, I am saying it's an indication of preemption.

Dr. MEYER. Gentlemen, excuse me. I will yield to the witness, of course. Go ahead, sir.

Mr. BECKER. Now, I have lost your last question.

Professor PLAGER. My last question is what can we expect from the ATA, Mr. Becker?

Mr. BECKER. Well, you left the impression that the airlines had one position and ATA had another.

We work for the airlines. Our position is the airline position.

The airline position to date in local jurisdictions and State jurisdictions has been opposed to State regulation, or local regulation.

Professor PLAGER. Of any kind?

Mr. BECKER. I am talking about where it gets into safety, or noise regulation.

Professor PLAGER. Or noise regulation?

Mr. BECKER. Yes; I am not getting into zoning now.

Professor PLAGER. No.

Mr. BECKER. As a matter of fact, on that basis the Governor of Rhode Island just vetoed a bill which would have done just the opposite. That was 2 weeks ago.

Dr. MEYER. Do you have another question?

Professor PLAGER. No, sir.

Dr. WHITCOMB. Mr. Becker, are you concerned about noise inside the airplane as well as outside, with the ATA?

Mr. BECKER. No.

Dr. WHITCOMB. No?

Mr. BECKER. We don't get involved in that.

Dr. WHITCOMB. Are we hearing testimony eventually from somebody who might?

Mr. BECKER. The airlines are interested in having quieter airplanes inside, but we haven't gotten involved in that in the association. It is not an industry problem.

Dr. WHITCOMB. Well, it could be. There are pilots of helicopters who, if they proceed in their current jobs for more than 2 or 3 years, will be deaf.

Mr. BECKER. That's right. We don't have any helicopter operators in our association.

Dr. WHITCOMB. You don't? Okay. I will save that question. Let me conclude by chiding you gently, I hope; in your initial testimony, and in your printed testimony on page 1, paragraph 1, you say:

> Moreover, as studies by the National Aeronautics and Space Administration have shown, reaction to the same noise exposure varies with individuals and, in fact, communities. It is this subjective element that complicates efforts to determine whether a given noise reduction program will, in fact, have any measurable effect on reducing noise annoyance.

Mr. BECKER. That's right. It's the TRACOR study.

Dr. WHITCOMB. Again.

Mr. BECKER. Well, it was financed by NASA for study, some $2 million

Dr. WHITCOMB. This implies unless all human beings respond the same way to the same thing you cannot predict what effect any change in their environment is going to have on them; is that true?

Mr. BECKER. Well, this is what the TRACOR study said, in their conclusion 4, and that was dated September 4, 1970. That certainly is not the kind of predictions to describe rules or regulations around, as the FAA has been contemplating.

Dr. WHITCOMB. Well, these are two separate points; one is how well you can predict from a correlation coefficient, and how much variance might be accounted for by a coefficient of, say, 0.4, which is not as bad as you seem to feel. But the point I am abstracting from your testimony indicates to me that it is not proper to consider averaging across the variability of individuals to get a typical response of people.

Mr. BECKER. If I left that impression, I didn't mean to——

Dr. WHITCOMB. Yes.

Mr. BECKER. Because the thing that we think research money would be spent on—Professor Plager won't like this—but gauging from what he said this morning, this is where we think we should really spend some early money to find out the real reactions of people. So far this has been done very badly. It has been done many times badly. With little money put into it, starting out with BB&N's work back in 1962 and 1963, right on up to the present, if you look through all the BB&N publications that have come out in the last 8 years, they keep referring to that original one. The original one was a $25,000-some-order-type of study which was just assimilation of a bunch of other studies already done.

Dr. WHITCOMB. I agree the social studies need more funding, but I don't think we are in that bad a shape as far as data. There are certainly many cases in which we have plenty of material to back us up.

Mr. BECKER. Yes.

Dr. WHITCOMB. I don't think we should wait for more research in 10 more years.

But let me just say one thing about the TRACOR study, since it has been mentioned twice now; they found that noise was up fourth or fifth in order of importance in terms of determining annoyance or complaint behavior from aircraft noise.

Mr. BECKER. Yes, sir.

Dr. WHITCOMB. It wasn't inconsequential, but it wasn't the first order. Some of the first order elements were fear of the airplane falling on you, and one that people ought to keep well in mind is that concern that the establishment is not sympathetic and responsive to their misery.

Mr. BECKER. That's correct. I would like to say our subjective response proposal would be a 2-year program. We don't think it ought to be long, either. I would like to make one more point that I—it's in the paper, but I didn't make here—this relates to land use.

It's worth noting contrary to the oftheard argument that the airport noise has depressed the market value of particular parcels near some airports, that conclusions of actual studies are that such property values are far more likely to increase in overall value, and we have a study on that that is available, if you would like to see it.

Dr. **Meyer.** Thank you very much, Mr. Becker, and thank you, panel. Before you leave, Mr. Becker, I would like to call attention to a couple of things I think need to be made clear in being presented to the audience, and appear in the record—one, the question of Federal preemption versus use restrictions and control of States is a subject that is being very carefully explored by my office for the administrator in the discharge of our responsibilities with regard to this report to Congress.

This is a very, very important subject, and it is one I think which is not quite as clear, as some people would give the impression, with regard to the rights of States to undertake certain use requirements, even to the extent of saying how things might be done going in and out of airports. And this will appear in our report to the Congress as part of our study on the model law, as part of our study on the entire field of activity with the Federal Government, because there are other elements beside the FAA involved, such as the Federal Housing Administration and others. Secondly——

Mr. **Becker.** I would agree with that. It isn't black and white.

Dr. **Meyer.** Certainly we agree with you; I think everybody on the panel does. We have got to arrive at better measures of impact of noise on human beings and environmental issues, and again this is a major element of our present study and will be a major component of the research plan and program that we plan to implement, Mr. Becker. Thank you very much. You have been an excellent witness.

Mr. **Becker.** Thank you, sir.

Dr. **Meyer.** Now, following along, it appears highly desirable to have some information presented from the airport operators. As most of you know, airports are generally owned by municipalities or government entities, States—they are not, in the main, privately owned or operated, so we will ask Mr. J. J. Corbett of the Airport Operators Council International to come and appear. Mr. Corbett, it's nice to have you here, sir.

STATEMENT OF J. J. CORBETT, AIRPORT OPERATORS COUNCIL INTERNATIONAL

Mr. **Corbett.** I am J. J. Corbett, vice president—Federal Affairs of the Airport Operators Council International (AOCI). The Airport Operators Council International is the association of the governmental bodies which own and operate the principal airports served by the scheduled airlines in the 50 States, Puerto Rico, and the Virgin Islands, as well as in many countries abroad. In 1970, U.S. member airports enplaned about 90 percent of the domestic and virtually all of the U.S. international scheduled airline passenger and cargo traffic. In addition, our local government members operate many reliever and other general aviation facilities which supplement the larger airports in their communities and regions. (A listing of our U.S. members is appended for your information.)

We greatly appreciate the opportunity to express the views of our U.S. membership on the national problem of aircraft noise pollution and to offer some recommendations for Federal actions directed toward its prompt abatement. Our interest in these hearings is particularly keen as we were quite active in terms of legislative support for the Title IV Clean Air Act provisions under which this hearing is being held.

Our airport operators are in a particularly uncomfortable posture with respect to aircraft noise. They have very limited powers to alleviate the noise which is created by the aircraft and not by their airports. They are caught between intense community pressures and their own knowledge that preparations must be made to meet anticipated traffic growth. Conservative forecasts of air travel growth definitively show the necessity for 100 new airports in this Nation by the end of this decade if the public's requirements are to be met.

Community airport providers, being caught in the tidal wave of environmental concern, are damned if they do and cursed if they don't. However, our members firmly believe that new capacity in our national airport system can be achieved with all due environmental safeguards. The fact that airport development is being stymied across the Nation and around the world suggests that others do not agree. The major underlying issue is aircraft noise.

The single largest shadow which darkens aviation's development over the next decade will not be the faltering finances of the airlines nor the recent congressional decision to forego a U.S. brand SST. It will be the inability of the ground facilities—the airport system—to accommodate the people and planes which desire its services.

Ear pollution, not air pollution, is aviation's environmental challenge. Unless the effect of aircraft noise on people is reduced, tomorrow's aviation system will be a carbon copy of today's.

History of the Aircraft Noise Problem

Some background information on the history of aircraft noise may be helpful. Until the introduction of jet aircraft, civil airports had generally existed in harmony with their neighbors. With the introduction of commercial jet aircraft in 1968 and with the increase in aircraft operations brought on by traffic growth, the noise problem began to intensify. Larger aircraft required some communities to extend runways and overall airport dimensions to accommodate increased takeoff and landing needs of the jet equipment. The combination of increased operations and larger jet aircraft brought airports closer to their neighboring communities. And the jet aircraft also brought new levels of noise pollution.

Since 1958, the general trend has been toward bigger and noisier aircraft, as there was no control over the noise characteristics of the aircraft the manufacturers provided and the airlines purchased. Increased numbers of commercial jet operations daily intensified the problem and raised it to one of national significance.

Recognizing the critical nature of the noise annoyance to millions of citizens, the Congress in 1968 enacted legislation (Public Law 90–411) authorizing the FAA Administrator to certificate new and existing aircraft for noise acceptability purposes. The language was similar to existing law authorizing the FAA to certificate aircraft for safety purposes.

In the almost 2 years between enactment of the noise certification authority and FAA's first implementing rule, subsonic noise exposure in many communities continued to increase. According to a recent survey conducted by AOCI, approximately $3.8 billion in noise claims are estimated to be currently pending against public airport operators. Even individual States and individual communities have brought suits and injunctive actions against various communities owning airports because of the aircraft noise problem. Noise is the greatest constraint now to airport development.

Efforts by airport sponsors to mitigate the effect of aircraft noise on surrounding communities have been intensive but local governmental solutions are not available. Most major airports are already impacted by high-cost residential development. The acquisition of vast amounts of land in these communities is neither practical nor possible, for the complete dislocation of many thousands of people in established communities, particularly residential areas, is not politically possible. Further, the acquisition costs are economically prohibitive; noise affected land, for example, at only one major U.S. airport is valued in excess of $7 billion.

In addition, the possibility of new airports to serve increased traffic is no panacea and, in many communities, even this possibility is evaporating quickly. Communities recognize the economic necessity for their connection to other areas of the country and the world through modern air transportation but are rejecting further intrusions on their environment from aircraft noise. As a result, the noise problem in many communities has indefinitely delayed the probability of additional airport capacity through new jetports.

The first and only noise rule thus far issued by the FAA became effective last December 1. This regulation, which applies only to future subsonic aircraft, says, generally, that new aircraft will not be certificated unless their noise levels—takeoff, sideline, and approach—are less than 108 EPNdB (effective perceived noise decibels) at each measuring point.

The current jet fleet is comprised of such aircraft as the DC–8, DC–9, Boeing 727 and the Boeing 707, all of which operate at noise levels in excess of the FAR part 36 limitation for future aircraft. No noise regulations have been adopted for the present jet fleet with the exceptions of the DC–10 and those Boeing 747's manufactured after December 31, 1971.

This level of 108 EPNdB for the new aircraft may be, as the statute specifies, "Economically reasonable and technologically practicable." Whether it is also "community acceptable" remains to be seen, but it does indicate an improvement over existing jet noise levels.

Typical Environmental Problems at U.S. Airports

In a growing number of American cities, airport opponents are proving highly successful in halting or severely delaying the construction of vital airport facilities, not only by legal action but also by invoking the environmental protection provisions of such recent Federal legislation as the Environmental Protection Act of 1969 and the Airport and Airway Development Act of 1970. A few examples will suffice.

More than 3 years ago, officials at Portland, Oreg., announced plans to spend $105 million to expand Portland International Airport, which hugs the southern shore of the Columbia River. Nearly 2 years ago, the Army Corps of Engineers authorized the Port of Portland, which owns the airport, to fill and dredge a 1-square-mile section of the Columbia to provide acreage needed for the expansion.

The landfill project has never begun—and there are doubts that it ever will. It has been blocked by three lawsuits brought by an alliance of conservationists and homeowners who live across the river in Washington. Inflation, no friend to malingering builders, has meanwhile added $40 million to the project's original cost estimates.

The Portland impasse is an example of what has rapidly become a pattern in this country—and in much of the rest of the world—where efforts are being made to build new airports and expand old ones. Los Angeles went more that 40 miles from its downtown center to select a 17,000-acre airport site in Palmdale, a dry, barren area in Antelope Valley. The Sierra Club is now suing to invalidate FAA approval of the site and the Federal Department of Transportation has temporarily stopped the flow of funds for land acquisition.

New York's Metropolitan Transportation Authority wants to convert the former Stewart Air Force Base, more than 60 miles from Manhattan, into a jetport. But community opposition has been stirred up, resulting in the filing of a lawsuit. Some conservationists in Canada are opposing Montreal's proposed new airport—potentially the world's largest—which is to cover more than 80,000 acres, most of it zoned to restrict construction of homes.

Efforts to build airports over or adjacent to waterways are hardly more successful than efforts made within huge tracts of land. The National Academy of Sciences in its report on New York's Jamaica Bay has killed the projected expansion of John F. Kennedy International Airport.

With local variation, the kind of resistance which has been described above has blocked or delayed jetport projects in Atlanta, Boston, Minneapolis-St. Paul, San Jose, Calif., and St. Louis, among other cities.

Nor are the problems of airport construction gaged solely by public antipathy. Responding to the public desire for better environmental planning and based upon the public's well-justified demand for a sound environment, Congress has linked the Airport and Airway Development Act of 1970—which will provide up to $280 million annually in Federal aid for airport construction—to a demand that developers of airports hold public hearings to explore in detail the environmental impact of their projects. The Secretary of Transportation is prohibited from authorizing any project if the project portends an adverse effect on the quality of life in a community unless the Secretary declares in writing that no feasible or prudent alternative exists. The procedures of the Department of Transportation and of the Federal Aviation Regulations are in turn carefully regulated by the President's Council on Environmental Quality.

Although it is too early to draw conclusions on the environmental problems of specific U.S. airports, several general points can be stated with certainty:

First, environmental review is desirable, and airport operators recognize that fact.

Second, the review process should be in the hands of those who have the expertise to make environmental decisions. This excludes most judges. Environmental decisions should be made by the administrative agencies of the U.S. Government, and unless they have committed gross procedural or other error, the judgments of these agencies should be upheld as final.

Third, people should be responsible and reasonable. The public, that is, should realize that modern civilization requires a reasonable balance between the demands of the environment and the demands of the air traveling public.

Additional Federal Efforts to Reduce Aircraft Noise at Its Source

Earlier reference has been made to the 1968 congressional enactment which authorized the FAA to certificate new and existing aircraft for noise acceptability purposes. This, as mentioned, has been quite helpful as an incentive to industry for meaningful noise abatement. Today's new aircraft are noticeably quieter than their predecessors. The B-747, DC-10, and the L-1011 will all provide noise-blighted communities with some environmental improvement.

Airport operators are highly pleased with the new aircraft and now suggest that future governmental and industry action can be concentrated toward modifying, so far as possible, the noise produced by the current fleet of aircraft. This involves the possibility of retrofitting those of today's aircraft which will not be soon retired so as to reduce their noise effects.

Work on the possibility of retrofitting has been part of the government and industry program for some time with some hopeful results.

As part of the Interagency Aircraft Noise Abatement program NASA initiated a project in 1966 to "identify promising nacelle modifications on current four-engine turbofan-powered aircraft that would reduce the noise under the approach path by up to 1 EPNdB." In October 1969, NASA contractors reported on the results achieved under the contracts. The acoustic measurements showed the following reduction of noise in EPNdB:

Operation	DC-8, McDonnell Douglas	707 Boeing
Approach (1 nautical mile)	10.5-12	15.5
Takeoff thrust (3.5 nautical mile)	2-3.5	3
Reduced thrust (3.5 nautical mile) (4 percent climb gradient)	8	3.5

In 1969–70, the Rohr Corp. completed a study for the FAA on the economic impact of implementing acoustically treated nacelle and duct configurations applicable to low bypass turbofan engines. According to Rohr's studies, retrofit will reduce landing noise by 10 EPNdB for DC–9, B–727, and B–737 aircraft, and by 13 EPNdB for 707 and DC–8 type aircraft. It will reduce takeoff noise by 8 EPNdB, including power cutback on four-engine turbofans, and by 5 EPNdB on two- and three-engine turbofans.

The NASA report shows that areas exposed to noise in excess of 100 EPNdB can be reduced by 85 percent under the approach path and by 50 to 55 percent under the takeoff path for the type of aircraft and retrofit treatment used in NASA studies. The indication in the Rohr report that the cost of retrofit can be recovered by a passenger fare increase ranging from 60 cents per $100 in 1975 to 8 cents per $100 in 1982 offers little evidence of any excessive economic penalty or burden. The Rohr report estimated the cost of retrofit at about $600 million for the current U.S. jet fleet.

On November 4, 1970, pursuant to the authority of Public Law 90–411, the FAA issued an "Advance Notice of Proposed Rule Making" (ANPRM) (docket No. 10664; notice No. 70–44) on Civil Airplane Noise Reduction Retrofit Requirements. The FAA's advance notice of proposed rulemaking constitutes the Agency's first significant step toward adopting any noise regulations for the current fleet of jet aircraft. At the time of the issuance of the ANPRM, FAA Administrator John H. Shaffer stated that,

> * * * Aircraft noise is the single greatest impediment to airport development in the United States at the present time and prompt remedial action is required if we are to meet the projected growth of aviation in the 1970's and beyond. The FAA is committed to using every legal regulatory technique at its disposal to reduce aircraft noise at the source.

AOCI Position on Retrofit

On the basis of the above technical information, AOCI feels that aircraft engine retrofit constitutes a potential means of substantially reducing aircraft noise of the current jet fleet. Retrofit, therefore, deserves further examination as proposed by S. 1566, known as the Cranston-Wilson bill to control aircraft noise. This measure, if enacted, would require the appropriation of $35 million to do retrofit prototype research on a cross section of today's aircraft. Those aircraft types for which retrofit proved technologically feasible and economically reasonable would be retrofitted under the Cranston bill by 1976. Those aircraft types for which retrofit did not appear feasible and practicable would be forced into retirement by 1976.

The Cranston bill, if enacted, would require, by 1976, that all subsonic aircraft operating within the United States reduce their noise levels (at all three measuring points), by 10 EPNdB from current noise levels or reduce noise levels to those adopted in FAR part 36, appendix C (108 EPNdB), whichever reduction is greater. AOCI testified before the Subcommittee on Aviation of the Senate Commerce Committee in general support of S. 1566. Following AOCI's testimony, a presentation of the Rohr Corp. stated that a 50-percent reduction in noise levels of all U.S. two- and three-engine aircraft is now within the state of the art through nacelle retrofit at a total cost of about $500 million.

Uniform Noise Levels for All SST Aircraft

Finally and for the record, the Environmental Protection Agency should recognize that AOCI stands in support of a uniform noise level for all SST aircraft, irrespective of national origin. Information on the noise characteristics of the Concorde suggest that it is not capable of meeting the noise limitations of part 36, appendix C of the FAR. No definitive information is yet available on the amounts of noise to be produced by the TU-144. Legislation has been introduced in at least a dozen State legislatures to prohibit SST aircraft landings within those States.

Clearly, the problem of establishing maximum noise levels for supersonic aircraft requires uniform action on a national (and international) level. Congress should not abandon the field to local public entities or to State legislatures. To do so would result in inadequate and—certainly—nonuniform supersonic aircraft noise standards. We all recognize that civil air transportation is an interstate activity requiring uniform Federal laws. The United States must take the lead in establishing responsible maximum aircraft noise regulations in the public interest.

We therefore urge the adoption of Federal regulations requiring that no supersonic aircraft be permitted to land at any U.S. airport unless such aircraft can comply with the maximum noise level standards specified for new subsonic jet aircraft in sections C36.3 and C36.5 (a) and (b) of appendix C (evaluated as prescribed by app. B) of part 36 of the FAR.

AOCI Recommendations Regarding the Noise Compatibility of Airports

Based on the foregoing discussion, AOCI presents the following recommendations to the Environmental Protection Agency for consideration.

1. The aircraft noise problem must be resolved on a national and international basis through the efforts of national governments, the airlines and the aircraft manufacturers, and with the assistance of local airport operators. Actions must be taken to: (1) Reduce noise at its source (the aircraft engine); (2) strengthen the implementation of aircraft noise abatement operating procedures; and (3) work toward compatible land use in the development of new airports.

2. The economic reasonableness and technological feasibility of aircraft engine retrofit for the current jet fleet of subsonic aircraft should be thoroughly examined through the appropriation of $35 million by the Federal Government for a cross-section prototype retrofit program. Those prototypes for which retrofit proves reasonable and feasible should be retrofitted by 1976, and those prototypes for which retrofit does not prove reasonable and feasible should be retired by 1976.

3. Noise limitations, as established by part 36 of the Federal Aviation Regulations and by ICAO draft annex 16 at a maximum

of 108 EPNdB, should be applied uniformly to all present and future aircraft, including the Boeing 747, and DC-10, the L-1011, and all supersonic aircraft including any future U.S. SST, the Concorde, and the TU-144.

4. Aircraft noise reduction should be accomplished by the Federal Government through reasonable implementation of safe aircraft operating procedures including the use of preferential runways and noise abatement takeoff and landing procedures.

5. Where legally and economically practicable, compatible land use planning should be implemented at new airports and in the preservation of larger vacant land where still available in the vicinity of older airports. In those airport communities which are already heavily impacted by residential development, compatible land use planning should not be presented as a solution to the aircraft noise problem unless some workable method for implementing such planning accompanies the issuance or publication of such a plan.

6. Since most environmental problems now confronting airport operators and their communities are national and international in scope, such problems cannot be effectively regulated or resolved on the State and local level. The Federal Government should assume its proper responsibility in this area rather than attempting—as has been done in the aircraft noise area—to shift the burden to the local airport operator. The Federal Government should acknowledge its preemption of both the legal and financial responsibility for aircraft noise since it alone has the power to uniformly regulate aircraft noise.

7. Regarding the process of environmental review required of airport operators and others seeking Federal funds under the Environmental Protection Act of 1969 and the Airport and Airway Development Act of 1970, airport operators support informed citizen participation in the environmental review process through full and forthright sponsor disclosure of all actions significantly affecting the environment. Airport operators recommend, after such an environmental review process has been completed, that the progress of aviation requires a reasonable balancing on the part of the various Federal agencies between the demands of the environment and the demands of those who wish or need to travel by air.

Summary

Aircraft noise pollution is viewed by governmental airport operators as the single greatest constraint to orderly aviation development in the 1970's. New airport capacity is stalled across the Nation and around the globe primarily because of understandable community and public disaffection with the noise of current-day aircraft. The single most beneficial step offering promise of noise alleviation is accelerated Federal applied research toward, and a prompt Federal decision regarding, the retrofit of the existing jet fleet, primarily for those aircraft whose useful service life exceed 5 years. The international and interstate nature of air transportation requires that action to mitigate aircraft noise be concentrated on reduction of noise at its source—the aircraft engine—and that Federal or international action, and not inconsistent State/local measures, be expedited.

AIRPORT OPERATORS COUNCIL INTERNATIONAL

U.S. Public Members by State

June 15, 1971.

Alabama: Birmingham, Department of Aviation; Huntsville, Madison County Airport Authority; Montgomery, city of.

Alaska: Alaska, Department of Public Works, Division of Aviation.

Arizona: Phoenix, city of.

Arkansas: Fort Smith, city of.

California: Bakersfield, county of Kern; Fresno, city of; Hayward, Airport Department, city of Hayward; Los Angeles, Department of Airports; Oakland, Board of Port Commissioners; Palm Springs, city of; Riverside, County Airports Department; Sacramento, county; San Diego, Unified Port District; San Francisco, Airport Department—city and county of San Francisco; San Jose, city of, Municipal Airport; Stockton, Department of Aviation, county of San Joaquin.

Colorado: Colorado Springs, city of; Denver, Department of Public Works, city and county of Denver; Pueblo, Memorial Airport.

Connecticut: Connecticut, Department of Aeronautics.

Delaware: Wilmington, Transportation Board of New Castle County.

Florida: Daytona Beach, city of; Fort Lauderdale, Board of County Commissioners, Broward County; Jacksonville, city commission; Melbourne, city of; Miami, Dade County Port Authority; Orlando, city of; Pensacola, city of; Sarasota, Manatee Airport Authority; Tampa, Hillsborough County Aviation Authority; West Palm Beach, Board of County Commissioners.

Georgia: Atlanta, Department of Aviation; Savannah, Airport Commission.

Hawaii: Hawaii, Department of Transportation.

Illinois: Chicago, Department of Aviation; Moline, Metropolitan Airport Authority of Rock Island County; Rockford, Greater Rockford Airport Authority.

Indiana: Evansville, Vanderburgh Airport Authority District; Fort Wayne, Board of Aviation Commissioners; Indianapolis, Airport Authority.

Iowa: Cedar Rapids, Municipal Airport Commission; Des Moines, Department of Aviation; Mason City, Municipal Airport Commission; Waterloo, Airport Commission.

Kansas: Wichita, Board of Park Commissioners.

Kentucky: Louisville and Jefferson County Air Board; Paducah, Airport Corp.

Louisiana: Baton Rouge, Greater Baton Rouge Airport District; Lafayette, Airport Commission; Lake Charles, Airport Authority for Airport District No. 1, Calasieu Parish; New Orleans, Aviation Board; New Orleans, Board of Levee Commissioners.

Maine: Bangor, city of; Portland, city of.

Maryland: Baltimore, Friendship International Airport Authority.

Massachusetts: Boston, Massachusetts Port Authority.

Michigan: Detroit, Board of County Road Commissioners, Wayne County; Flint, city of; Grand Rapids, Kent County Aeronautics Board; Saginaw, Bay City-Midland-Tri-City Airport Commission.

Minnesota: Minneapolis-St. Paul, Metropolitan Airports Commission.

Mississippi: Jackson, Municipal Airport Authority.

Missouri: Kansas City, Aviation Department; St. Louis, Department of Public Utilities; Springfield, Municipal Airport.

Montana: Great Falls, International Airport Commission.

Nebraska: Lincoln, Airport Authority, city of Lincoln; North Platte, Airport Authority; Omaha, Airport Authority of the city of Omaha.

New Hampshire: Manchester, Airport Authority.

New Jersey: Trenton, County of Mercer.

New Mexico: Albuquerque, Sunport.

New York: Buffalo, Niagara Frontier Transportation Authority; New York and Newark, the Port of New York Authority; Syracuse, city of.

North Carolina: Charlotte, Douglas Municipal Airport; Greensboro, High Point Airport Authority.

Ohio: Akron-Canton, Regional Airport Authority; Cincinnati, Kenton County Airport Board; Cleveland, Division of Airports; Columbus, Metropolitan Airport and Aviation Commission; Dayton, Department of Aviation; Toledo, city of; Youngstown, Municipal Airport.

Oklahoma: Oklahoma City, Airport Trust; Tulsa, Airport Authority.

Oregon: Portland, Port of.

Pennsylvania: Allentown-Bethlehem-Easton, Lehigh-Northampton Airport Authority; Pennsylvania, Aeronautics Commission; Philadelphia, Department of Commerce.

Rhode Island: Rhode Island, Division of Aeronautics.

South Carolina: Columbia-Richland-Lexington, Airport Commission; Greenville-Spartanburg, Airport Commission.

Tennessee: Chattanooga, Department of Public Works; Knoxville, city of; Memphis, city of; Nashville and Davidson County, metropolitan government of.

Texas: Dallas, Department of Aviation; Dallas-Fort Worth, Regional Airport Authority; El Paso, city of; Fort Worth, city of; Houston, Department of Aviation; San Antonio, Department of Aviation.

Vermont: Burlington, Burlington Airport Commission.

Virginia: Newport News, the Peninsula Airport Commission; Norfolk, Port and Industrial Authority.

Washington: Seattle, King County, Boeing Field International; Seattle, Port of Seattle Commission; Spokane, Airport Board.

Washington, D.C.: Washington, D.C., FAA Bureau of National Capital Airports.

West Virginia: Huntington, Tri-State Authority.

Wisconsin: Milwaukee, Airport Department of Milwaukee County.

Puerto Rico: San Juan, Puerto Rico Ports Authority.

Virgin Islands: Virgin Islands, Port Authority.

Thank you, Mr. Chairman. I will be happy to respond to questions.

Dr. **Meyer**. Fine. Thank you, sir, for a very excellent summary of your paper, which, as I glance through it, contains information of tremendous value. And we may have to communicate with you from time to time to get some more specific discussions regarding some of the content.

The panel, any questions?

Professor **Kerrebrock**. With regard to your expectations for the future, I would like to have a little clarification.

There are two views as to the significance of the next, the new generation of aircraft, the DC-10 and the 747, and their impact on the airport noise problem in general.

One, of course, is a great sense of relief that they are quieter than the last generation of aircraft, but on the other hand, when one takes account of the projected traffic increases which you have alluded to, at least one study of Kennedy Airport has predicted that even if all of the aircraft flying out of Kennedy Airport essentially were of this type, by 1978 or 1980, the noise problem would be considerably worse than it is now because of the increased traffic.

Do you think that this is a reasonable projection for the Nation as a whole?

Mr. **Corbett**. Well, we hope that the new generation of aircraft, which not only are quieter, but are larger, will be able to handle a larger number of passengers without increasing the number of flights proportionately, so that over at least the short term, we can purchase some time to further modify the aircraft at the source.

Professor **Kerrebrock**. But you do expect that further modification will be required, then, by when, 1980 or 1978?

Mr. **Corbett**. In terms of reduction of the noise at the source?

Professor **Kerrebrock**. In terms of bringing the overall noise impact in a community like Los Angeles or New York to an acceptable level.

Mr. CORBETT. The situation is essentially this: The communities—the environmentalists, with their very proper concerns, are saying to airport operators,

> You are part of the aviation community; you tell the rest of the aviation community that what they have been doing is darn good, but it isn't enough. Until you can do more, no new airports, no new runways, no new airport expansion,

so the airport operator is going to be pressing to the entire aviation industry for whatever actions are possible, technologically possible, of course, to reduce the effect of noise on people, and if, as Mr. McPike said, your aircraft now can meet 108, we are going to be pushing for less than 108 EPNdB. It has to be a continuing process.

Professor KERREBROCK. Thank you.

Mr. MARTIN. Mr. Corbett, for the sake of argument, if retrofit went through—and, of course, with the DC-8 you are getting quieter airplanes, and therefore the boundary lines that have a major annoyance are getting closer to the airport, are the airport operators opposed to a compromise situation as the ban gets closer to the airport, taking a look at land acquisition to eliminate the real bad areas?

Mr. CORBETT. Not at all. I think the statistics will indicate that the city of Los Angeles has expended $130 million in land acquisitions to take care of the most critical areas of their airport.

When that situation develops, it will be a tradeoff; airport operators will do their best within their powers to protect people from noise.

The true solution to the aircraft noise problem in the viewpoint of the airport operator is a combination of all three factors: Reduced noise at its source, to reduce the effect of noise on people—and that includes noise abatement procedures—and the third area is compatible land use.

As indicated in the testimony, with impacted land areas around airports now, to change that whole area of development is impossible politically because the people don't want to move. They want noise to be reduced in the future; for new airports more land is being acquired, more zoning is being accomplished to protect this situation from happening again for a future generation.

In Montreal, for example, 80,000 acres, square acres have been acquired for new airport.

Even with that there are environmental concerns being expressed.

Mr. HINTON. Mr. Corbett, I would like to just mention, I think the recommendations that you have included in the end of your paper are quite good.

You do appear to adopt, as you say, the more balanced position that you agree that other actions will probably be necessary in addition to the reduction of the noise at the source through retrofit, or improved designs of new aircraft.

I would like to have your reaction to a question as, you know, under the provisions of the Airport-Airway Development Act of 1970, the airports are now required to meet certain safety standards for airport design, layout, equipment, facilities, that sort of thing.

I wonder if—you mentioned environmertal controls; now, do you object to the placement of environmental controls around airports which would be, essentially, the same pattern of safety controls, but they would be applied in terms of the impact of airport operations on surrounding communities?

Mr. CORBETT. I think that primarily——

Mr. HINTON. Standards be set for that purpose?

Mr. CORBETT. I think that is primarily addressed at the time of construction, under the legislation you are referring to, there can be no major expansion of an airport or runway, or addition of a new airport in this Nation after May 21, 1970, without very long, extensive, careful environmental review.

We support that legislation very strongly.

On terms of a continuing review of airport operations, to make sure that they are not pollutants on a daily operational basis, we would have no objection to any environmental agency taking that responsibility, because for airport operators to have a successful facility that is amenable to the airport neighbors, we have to do everything we can to make sure that aviation technological development does not conflict with the community's environmental concerns.

Mr. HINTON. I think that is most enlightening.

Thank you.

Professor PLAGER. Just to follow up on that, I notice, Mr. Corbett, that in the attachment to your statement you list the members of your association—and there are quite a number of those that are governmental bodies of one kind or another.

Let's assume hypothetically for the moment that out of all of this will come a coalition of effort by the Federal Government, by State government, by local government, and by the airport proprietors, all addressing themselves to what is the most sensible economic and effective way to deal with this problem, and hopefully with the support of the industry, let's assume they turn to you and they say, "All right, Mr. Airport Operator, what can you do? What can be done?"

What specific things are within the realm of the airport operators' world that can contribute to solving this problem?

Mr. CORBETT. I think the question is two part; it's what can you do, and is it going to be effective.

Professor PLAGER. All right.

Mr. CORBETT. Just to follow up one question that was asked of the prior witness, how about taxing an airline—how would taxing an airline on the amount of noise that aircraft makes—studies have been done at a number of U.S. airports as to whether, instead of charging aircraft based on weight in terms of landing fee, you charge on the basis of time on runway use, on the amount of noise that is made.

The question is a landing fee is generally a negotiated situation between an airport and the airlines, and from the prior discussions, it is quite clear that the airlines would not agree to that approach. That is one potential area that does not appear to be fruitful at this time.

Professor PLAGER. Let's assume for the moment that they will agree—leave out for the moment the present attitude of the industry, or some part of the industry, and let's just assume that, respond in terms of what you think would be a sensible, some specific sensible things that could be done.

One of them, I take it, is to rewrite the lease arrangements between the operator and the airline, charging a fee in terms of noise level. That is a very interesting idea. How about some others?

Mr. **Corbett**. Well, the potential areas may be three; regulatory, economic, or by way of public opinion.

Thus far airport operators, through our association, and directly, have been trying to interest government at all levels about the problems of aircraft noise abatement.

In terms of regulation, airports can do things, but there are constraints on what they can do.

The thing that has been mentioned, quite properly by Mr. Becker before me, is that an airport is part of a national and international situation. To have a number of inconsistent acts by one government, either State or local, different in another jurisdiction where the aircraft next lights down, we think takes away from the interstate commerce aspect of aviation, and in the broadest sense, international.

If you want the real idealist way to lower aircraft noise, you go to an international forum, not a national forum.

Professor **Plager**. Are there any specific programs that the airport operators themselves, at the local level, you know, things like get back to preferential runways—that is not an international problem—I mean, that is a local problem, isn't it?

Mr. **Corbett**. No, but as I think as has been mentioned earlier—and I am sure the pilot following me, the pilot who is following me will address himself to it, from the time the aircraft starts moving down the runway, that so far as the airport operator understands Federal law, it's a Federal responsibility as relates directly to safety, if the FAA, through preferential use of runways, more and better noise abatement procedures can increase—can decrease the noise exposure while keeping pilots and everyone else happy in terms of safety, the airport operators are strongly behind it.

Can they do that strictly? My understanding of the law is that the airport operator's legal ability, in areas relating to air traffic control and the flight of aircraft is minimal, if existent at all.

Professor **Plager**. One of the constraints, then, you feel from your industry's viewpoint is an unclarity as to what your authority is in this area; is that what you are saying?

Mr. **Corbett**. I am not sure if I am clear. I think we don't have any authority. I think it's clear that we don't.

Professor **Plager**. In any event, that is it. OK. I see. Thank you.

Dr. **Whitcomb**. Mr. Corbett——

Dr. **Meyer**. I think that is an important point.

Dr. **Whitcomb**. Mr. Corbett, do you think the STOL aircraft holds any chance of alleviating any noise in the future?

Mr. **Corbett**. Yes. One of the beneficial studies that have been going on within aviation, the aviation community for some time is what we call an industry work group; it's composed of the manufacturers of aircraft, international, domestic airlines and airport operators.

One of the things they have worked on is to try to determine what the acceptable level of noise would be for STOL aircraft in a short term.

I think their studies indicate that a STOL-developed aircraft should be capable of approaching 95 EPNdB, and that has been suggested in that area, after consultations, and very good cooperation among all those parts of industry.

Dr. **Meyer**. Thank you very much, sir.

We appreciate your time in coming before us today. I should next like to ask Capt. Richard Heller of the Airline Pilots Association to come forward, if he would, and give us his remarks with regard to how the airline pilot, the operator of the aircraft, views the question of safety and noise. Is Captain Heller here?

(No response.)

I guess because of the delay in our schedule, he may have had to proceed on, to get on with maybe flying an airplane. I have been requested, since apparently there are some people who have arrived since we started, if we would again identify the panel members, so I shall do so.

I am Alvin Meyer, the Director of the Office of Noise Abatement and Control of the Environmental Protection Agency.

We have Professor Kerrebrock from MIT. We have Mr. Martin from the Society of Automotive Engineers; Mr. Lloyd Hinton, from the Metropolitan Aircraft Noise Abatement Council of Minneapolis; Professor Plager from the University of Illinois; and Dr. Whitcomb of the National Research Council.

Would Mr. Sheldon Samuels of the Industrial Union Department of the American Federation of Labor, Council of Industrial Organizations, please come forward? Sir, at this time we are glad to welcome you to the hearings, so we might hear, as a bridge between the problems of the aeronautical industry and its impact on the community, and impact of industry on to their neighbors, about the views of organized labor on this important subject. Glad to have you here, sir, and sorry we have been so long in getting to this point, but we are getting closer to our schedule.

Mr. **Samuels**. Thank you, Dr. Meyer.

STATEMENT OF SHELDON W. SAMUELS, AFL-CIO

Mr. **Samuels**. Dr. Meyer, ladies and gentlemen, as Director of Occupational Health, Safety and Environmental Affairs for the Industrial Union Department of the AFL-CIO, I must on occasion, be critical of Government. I would, however, like to take this occasion to point out the excellent design of this hearing. In addition, however, it's our hope that our place on the printed agenda is not indicative of the weight given our views by your office.

Dr. **Meyer**. It was not so intended, sir; it was to serve as a bridge between the formal industry presentations and the public presentations that will follow on the next day, but I realize you have a timing situation. Indeed it was not intended.

Mr. SAMUELS. Of course I am jesting, sir, and I thank you for the consideration. I am appearing today on behalf of 58 unions and 7 million workers.

With me is the Honorable Fred Linde, assistant to the President for Environmental Affairs of the Oil, Chemical, and Atomic Workers, a professional engineer and chairman of the Kansas State House Committee on the Environment, and consultant to the occupational health, safety, and environmental programs of the Industrial Union Department, AFL–CIO.

Tomorrow I will introduce a delegation from a lodge of the International Association of Machinists in Benton Harbor, Mich., and, if their negotiations permit, a delegation of steelworkers from this area.

In view of your plan for these hearings we will confine our remarks to a very simple description of some problems of industrial noise as an occupational and as a community hazard.

At later hearings we will discuss the problems of standards and legislation.

We hear a great deal these days about the productivity of the American worker, a concept whose meaning shifts depending upon whether it is being used in employer-employee contract negotiations or at a stockholders annual meeting.

There is, however, another concept whose meaning does not shift because of its very concrete use: subsidy.

It is a key term to the understanding of the economics of pollution. Acceptance of pollution—noise-air-water—in the community of the workplace is, in the economic sense, a subsidy by the community or by an employee, of the design, production, and marketing of a product.

This subsidy takes the form of economic damage, aesthetic insult, and the pain and anguish of death and disease.

To illustrate the subsidy of noise pollution we have taken noise level recordings and readings at three plants; the last, in Benton Harbor, will be discussed tomorrow. Today I want to introduce into the record the following slides, recordings and descriptions.

Slide 1, please.

[Showing of first slide in series.]

I apologize——

Dr. MEYER. Will you turn the lights down, please.

Mr. SAMUELS. For its vagueness. It's meant to focus on a simple sign. It talks about safety glasses; in the past, and unfortunately, even today, is the focus of occupational health and safety programs at the Federal and State level. Obviously they are not enough.

[Showing of next slide in series.]

TAPE RECORDING. United States Steel, South Works, Chicago, Ill.

[Showing of next slide in series.]

TAPE RECORDING. Average decibel readings, 74 to 80.

[Showing of next slide in series.]

TAPE RECORDING. That was the Indiana Forge & Machine Co. Average 98 to 102; peak value, 104.

Mr. SAMUELS. These, of course, are all on the A-scale.

TAPE RECORDING. 94 decibels, diesel traffic noises.

The peak readings of 94 occurred only when the diesel trucks were passing by.

Mr. SAMUELS. I think that is the end of our audiovisual display.

Dr. MEYER. That was a very fine one, sir.

Could we have the lights up a little bit, but not these bright ones, if we can avoid it, for the time being.

Mr. SAMUELS. All of the photos, readings, and recordings which you have seen and heard were taken not from within the plant, but from the sidewalks of the South Works of United States Steel. We were at the property line, about 100 feet from the walls of the source.

At Indiana Forge & Machine Co. we were at the property line about 20 feet from the walls of the source.

Conditions at Indiana Forge are rather typical. The plant employs 93 steelworkers. Like many small plants there is a good relationship between management and employee.

James McCarty, secretary to the local union, has worked there locally for 31 years. He describes it as a good place to work where conditions are not worse than in any other forge. These conditions include a subsidy of the company, in the form of probable hearing loss, through the acceptance of literally deafening noise. There is no evidence of any kind of hearing conservation program. Unfitted and virtually useless earplugs and cotton are available on request. There is little comfort in the fact that even management in this plant may suffer with their employees, since they are investing rather than subsidizing the cost of production.

Safety and health inspection of the plant seldom, if ever, occurs. The employees, in fact, seem to prefer handling these problems directly with the employer. They are greatly concerned about the financial well being of the company, and yet something must be done.

In concluding our formal remarks today, we would like to emphasize the relation of noise to other hazards, such as safety. The ability to avoid a hazard in the operation of a machine—or an automobile—often depends on rather subtle nuances of sound. If, because of background noise and loss of hearing, the operator is distracted, cannot hear changes in sound around him, an instruction or even a warning screech, his life and the lives of others are in danger.

The consequence is that an untallied, but major effect of noise pollution is death and injury on the job and in the street.

We have had, within the last couple of weeks, at least two major accidents in this country in which men have been killed because they could not hear the warnings.

Thank you very much.

Dr. **Meyer**. Thank you very much, Mr. Samuels.

Panel?

Mr. **Hinton**. I would like to ask a couple of questions. You didn't mention the Walsh-Healy Act, Mr. Samuels. I wonder if you are familiar with the provisions of that act?

Mr. **Samuels**. Yes. That act, as you know, has been preempted by the Occupational Safety and Health Act. The primary enforcement for that, of course, is the U.S. Department of Labor.

The Labor Department has, in effect, called for a moratorium of the standards related to noise. Under their current published regulations they would not be enforced until February of 1972.

We are, of course, objecting to that moratorium.

Mr. **Hinton**. I agree with you, Mr. Samuels.

Do you, or the gentlemen with you, know about the existence of meters that are capable of measuring cumulative exposure?

Mr. **Linde**. Yes, I am.

Mr. **Hinton**. They are relatively new, and I just——

Mr. **Linde**. They not only measure the cumulative exposure, but will also, can also be wired to show when a peak, some predetermined peak is exceeded, yes, sir.

Mr. **Hinton**. Thank you.

Mr. **Linde**. There are not too many of these available. The problem, of course, as far as any organized labor is concerned, is getting the concurrence of management to permit, to supply or, and/or permit use of these by the employees.

Dr. **Meyer**. Panel, any other questions? We certainly appreciate your comments, and are looking forward to your testimony tomorrow.

I think in your highlighting you and the presenter who are going to follow, Mr. Goodfriend, emphasize there is a relationship between, of course, what goes on in the plant and what is going on outside it, and also the airplane flying over, and the motor vehicle moving through the streets. We have to look at this as an integrated environmental problem, and we want to work very closely with you, as well as industry, and all elements of the public, so we look forward to your presentation tomorrow, sir.

Mr. **Samuels**. Mr. Linde has an additional comment.

Mr. **Linde**. If I may, doctor.

Dr. **Meyer**. Please.

Mr. **Linde**. As a politician I feel very badly if I were to leave here and not having had something to say, but I would like to emphasize that our process plant—and I speak particularly from the standpoint of chemical and petroleum chemical plants, and petroleum refineries, are, contrary to normal thought in many cases, very noisy.

So many of them use high pressure processes that require large compressors; the interstate gas transmission network uses compressors with single prime movers of 5,000 or 10,000 horsepower, and these are overpoweringly noisy, and have a very profound effect on the men that operate them.

The point I think we want to make and emphasize is that so much of this noise can be engineered out at the source, and I don't believe either Mr. Samuels nor I propose that everything be shut down, or anything like that. This is impossible. The economy and our society would come to an end if anything like that were tried.

But we would propose as legislation is drafted that it recognizes the state of the art now in the suppressing noise, and quite often it's only a matter of specifying, in the case of machinery that the noise level be so and so, and you do it with very, very little cost penalty. This is one of the points we want to make.

I also suppose that all of you gentlemen read the stories, several of them in the Wall Street Journal just recently about some of the horrible jobs people work at in the United States.

A drop forge installation such as Mr. Samuels referred to was one of these horror spots, and there are many others; an ammonia plant is quite noisy because of the combustion of gases, the pumps, the compressors, and so on.

It isn't a simple problem, we know that, but we also know that until steps are taken to alleviate it and control it, nothing is going to be done.

Thank you.

Dr. MEYER. Thank you very much, gentlemen.

We look forward to seeing you tomorrow. Mr. Goodfriend? Mr. Goodfriend is going to give a presentation regarding some studies of noise emanating from industrial operations. Lou, nice to have you here, sir, and we look forward to your remarks.

STATEMENT OF LOUIS GOODFRIEND, L. S. GOODFRIEND, AND ASSOCIATES

Mr. GOODFRIEND. Thank you very much.

Before I take a look at the formal remarks, which you have copies of, I should point out that there is a program going on right now under EPA to take a look at industrial noise sources, the levels out-of-doors, within the plant boundaries, the levels in the community due to these plant sources, the effects on the people, the plant neighborhood and community ground, to assess the current activity in noise abatement within the industries, to assess the state of the art and noise abatement technology, and to assess the regulatory activity, or report on regulatory activity which is currently going on. This is a continuing program which, as you know, has just been initiated. I am going to report on a few of the basic ideas involved.

Although it is well known that many types of industries make noise and that some members of the community object to some industrial noises while other neighbors do not, there has not to date been a systematic program to examine the nature of industrial noise and the noise effects.

An examination of my own prior work with industrial and community clients and the current EPA sponsored projects do clearly outline the nature and scope of our present knowledge in this field.

Industries for our purposes may be broadly divided into three general categories:

1. Manufacturing and assembly plants.

2. Process plants.
3. Utility plants.

In all of these industries are to be found only a few basic types of noise sources. The major noise source categories are:

1. Power sources—including motors, engines, heaters, furnaces, and generators.
2. Impact sources—including forgehammers, riveting tools impact hard tools, piledrivers, ore crushers.
3. Cooling and ventilating equipment such as fans, blowers, and cooling towers.
4. High-pressure gas and airflow systems such as valves, air inlets, and high-pressure discharges to the atmosphere.
5. Materials handling including cranes, chutes, conveyor buckets, and the materials themselves, such as steel parts impacting on each other, or structural steel sections being loaded or unloaded, and high-speed, high-pressure blowers of many types.

Surveying the communities around a number of plants indicates that noise level or loudness—if you will—is not the controlling factor influencing the acceptability of the noise in the community. Furthermore, not every machine of the same size and capacity is used the same way and no two are located in the same manner with respect to the community.

An examination of my own files of industrial noise complaint situations and information acquired in EPA's program do show a few trends:

1. Industry's neighbors in the community may not object to industrial noise even at fairly high levels, (*a*) If it is continuous, (*b*) if it does not interfere with speech communication, (*c*) if it does not include pure tones or impacts, (*d*) if it does not vary rapidly, (*e*) if it does not interfere with getting to sleep, and (*f*) if it does not contain fear-producing elements.
2. Sometimes political, social, economic, or interpersonal situations develop where the presence of the noise in the neighboring community is the substitute focus for what might otherwise lead to unacceptable consequences.
3. It also appears that single individuals or families may be annoyed by an industrial noise that does not annoy any other plant neighbors. This in many cases can be traced to unusual exposure conditions or to interpersonal situations involving plant management personnel.

Industry has been responsive in varying degrees to community pressure to eliminate sources of complaint. Although considerable noise abatement technology is available today, knowledge of such technology varies widely within the same industry, and similarly response with a single product industry will vary greatly.

I do believe that the day is past when a complaint is passed off as an eccentric to be tolerated and humored. However, I have noted that the cost problem can create problems for individual companies where a competitive pricing situation exists. Here there is a need for industrywide controls. In fact, the best solution will probably come on an industrywide basis for many reasons.

Returning for a moment to the behavioral problems, it should be noted that one or two articulate complainants or politically effective complainants can polarize a community. This again indicates a need for definitive standards by which to judge industrial as well as other noise exposures.

Looking for a moment at the current capability in noise control, it is possible to find many muffling and noise control systems. Many are still crude, and they do not eliminate the noise at the source, but as an example, a gas turbine generator can currently be quieted by enclosing it inside a noise control structure with suitable inlet and exhaust mufflers. The cost per unit is high, so high in fact that reduction of noise within the turbine itself might be amortized by the reduction in muffling expense. Other examples can easily be cited. Clearly there are many tradeoffs in the noise abatement process. Switching processes might be less expensive than muffling an existing system. Besides hardware, there is a moderate volume of noise control engineering going on in many industries. Some companies have staff personnel or work with university faculty members in applying current technology in the area of source noise reduction. This is not a high-technology area and so far there is little fallout from the military and aerospace fields.

The needs at present are:

1. To quantify the community response not on the basis of complaint versus noise level but on the basis of all the variables.
2. To disseminate information on the current engineering aspects of noise abatement technology as well as the hardware aspects.
3. To involve industries as units through their associations in advancing the state of the art of noise abatement.
4. To develop guidelines for industry on community noise exposure.
5. To develop a model industrial noise performance regulation that will enable industry to survive economically as quiet neighbors.
6. To develop suitable urban and regional planning concepts that will integrate compatible industries into new and redeveloped areas without destroying any citizen's equities in so doing.
7. To stimulate and initiate new efforts in developing noise abatement and to encourage and accellerate existing research and development in noise abatement.

Dr. **Meyer**. Thank you very much, Mr. Goodfriend. If I heard you the way I think I heard you, in your short and succinct statement, you, in effect, said the same priorities and the same problems exist with this aspect of community noise as are associated in the main with the aircraft and airport noise problem.

Mr. **Goodfriend**. You are quite right; to put it simply, we are all in the same boat. We have—we do need to determine what the factors are that make people respond negatively to noise, and positively.

Dr. **Meyer**. Thank you, sir. Panel on the right?

(No response.)

Panel on the left?

Professor **Plager**. Just a short question for you, Mr. Goodfriend; who is "we" in that sentence? Where does the responsibility lie for coming to grips with this range of problems? Do you have any thoughts on that subject?

Mr. **Goodfriend**. Yes; I think that the current action by EPA acting as a catalyst-coordinator and adviser, and supporting research is probably the best thing that we can do. I have seen other organizations, other Federal agencies, but they cover a narrow segment of the problem, and as I understand EPA's charge is to look at the entire problem and coordinate it, coordinate their work with the interagency noise abatement-transportation noise panel and so forth.

Professor **Plager**. Do you see in the future regulatory programs developing to deal with these problems? And if so, again, where does the general responsibility of the area fall there?

Mr. **Goodfriend**. I believe that there are regulatory activities that have to be taken at every level of government.

The model laws for zoning may be developed by the Federal agencies, but these should be promulgated at the State, county, and municipal levels.

Mr. **Hinton**. Mr. Goodfriend, I would like to just say that I completely agree with your call for comprehensive community planning where you would have your development planned in a way that you don't have one use conflicting with another in the vicinity. I would like to know, I would like to know your No. 1 need that you call for is to quantify community response on the basis of complaint versus noise levels.

Would you, without—would you let community response, would you first need to quantify this response before initiating action programs?

Mr. **Goodfriend**. I believe we do have to quantify the response. It may not be—we are currently doing it, the current tendency is to look at those, at the situations which cause complaint, and then develop some kind of a patch that will just reduce the situation, the noise, or the pure tone, or whatever, to just below the complaint threshold, and I think this is the wrong approach. I think we want to find out the reason for complaint, and it may not be level; it may be something else.

Mr. **Hinton**. I know it's wise to be able to know more exact knowledge about what the problem is in terms of human reaction, both physical and psychological; however, I have something, I am somewhat construed with the sense of urgency here, and I think the problems are pretty self-evident, and we don't have to get down to the last number in the quantification process prior to working at the top, you know.

Mr. **Goodfriend**. I am in complete agreement. I think we know the reason I listed, on these reasons, that industrial noise can occur at fairly high levels without complaint if it was not, if it's continuous, and if it doesn't interfere with speech.

The reason I listed those things is that we know that we can do this without generating complaints. We know that there are currently some techniques that give us very broad answers we can use.

Let's start with those, but let's continue to move on and get the detailed facts so that in the long term we can do a much better job of planning.

I don't think we know as much as we ought to. We can put in buffer zones, but we are going to be making those buffer zones bigger than we need to, and this has a strong economic impact on the community involved.

Dr. **MEYER**. Thank you very much. We appreciate your thoughts and your presentation, and look forward to working with you further on this. I would now like to ask Mr. Harter M. Rupert, of the Federal Highway Administration to come forward. Mr. Rupert has written a number of papers with regard to problems of noise associated with highway and automobile transportation and is setting the stage for information from some presentations from the automobile industry regarding what it can do about the source of noise that he is going to talk about.

We thought it would be useful to have him and a representative of the Highway Research Board present to the panel some basic information. Glad to have you here.

Mr. **RUPERT**. Thank you. If you will stay with me, I will try to proceed rapidly, and I think I can get my remarks in in a very few moments.

STATEMENT OF HARTER M. RUPERT, FEDERAL HIGHWAY ADMINISTRATION

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Mr. **RUPERT**. We are witnessing the beginnings of an all-out effort to control noise. This effort is part of the overall response of government, industry, and institutions of higher learning to the public's expression of deep concern for the environment.

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Traffic noise has been identified in several surveys as the most disturbing or annoying noise in residential areas. Although the noise from traffic may be often bothersome, there are no indications that the levels are sufficiently high to cause hearing loss. It is generally well known that thousands of people have voluntarily built, bought, or rented dwellings in areas having noise levels higher than many of us would consider desirable.

Does this mean that nothing should be done to control traffic noise? Of course not. Some useful analogies can be drawn between noise and floods, even though the undesirable consequences of floods are much more obvious and more easily identified. For many of this country's developing years, large numbers of people settled and developed the flood plains of our streams and rivers.

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Usually, this was done with the knowledge that the watercourse would periodically overflow its banks with consequent impact on the settlers. This does not mean that it was good for them or that some other segment of the public should be expected to endure the same hardships. So it is with noise. Although, some segments of the public appear willing to voluntarily reside in areas where noise levels are high, we cannot responsibly expect the entire public to accept these noise levels.

It should not be inferred that highway engineers, administrators, and professionals have done a less than adequate job. Quite the contrary. No other public works program known to man can match the achievements of this Nation's highway program. The important thing to remember is the shifting of goals and priorities.

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In the 1920's and 1930's we were attempting to establish a nationwide system of roads and provide all-weather surfaces. In the 1940's and 1950's, as the demand for mobility increased, traffic volume and speed increased. As a result, greater emphasis was placed on the needs of the traveling public by providing: Stronger and wider pavements, increased sight distance, flatter horizontal curves, grade separation structures, and limited access highways.

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During the 1960's, emphasis was placed on safety and beauty. The emphasis of the 1970's is concern for the environment.

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The highway program will respond to this emphasis just as well as it has to those of past decades.

The highway-related noise problem is very complex, so there are no quick or simple solutions. The control of this nuisance will require the concerted and coordinated efforts of many programs, agencies, firms, and individuals.

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There is good reason to believe that quieter vehicles can be manufactured. Apparently there has not been sufficient consumer demand for the manufacturing industry to produce quieter vehicles. In a competitive industry where a few dollars differential would place a competitor in an advantageous position, an individual firm finds difficulty justifying added costs for characteristics for which consumers apparently are unwilling to pay. We don't seem to mind a little noise when we are behind the wheel. In the case of many motorcycle, sport car, hotrod, and truck operators, noise is considered an asset rather than a liability.

If the manufacturing industry were furnished reasonable noise criteria which would be uniformly applied to all manufacturers, improvement could be obtained without jeopardizing the sales and profits of any individual firm.

The President has recommended Federal legislation which would enable this control. A bill has been introduced in Congress to provide this authority to the Environmental Protection Agency. This is a desirable and needed approach.

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If the manufacture of quieter vehicles were required, there is no assurance that they would remain quiet. Many instances can be observed every day where vehicles are operated with malfunctioning or modified mufflers or otherwise behaving in worse than showroom condition. Most State motor vehicle codes require that a vehicle not be operated without a muffler or in a manner which creates loud or excessive noise. The determination of what is loud or excessive requires a subjective determination on the part of an enforcement official. As a result, enforcement is difficult and ineffective. This is like having speed laws which advise the driver not to drive too fast.

California has taken the lead in adoption of numerical noise level limits for motor vehicles. Enforcement is achieved with noise level meters in a manner similar to the radar meters used in speed control. There are other States and some localities which have enacted similar laws and still others which have such legislation under consideration.

The Federal Highway Administration recommends State and local enactment and enforcement of numerical noise level limits. We are presently seeking possible means of further encouragement.

It should be obvious that reduction of the noise which the vehicle creates will not eliminate all highway related noise problems. There are practical limits on the extent to which noise from vehicles (and aircraft) can be lowered.

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We should not expect to get away with construction of an amphitheater near an airport or adjacent to a heavily traveled freeway. The same is true of some types of single family residences, some types of schools, hospitals, and many other types of land use.

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Many years ago we learned that we had to prohibit most kinds of development in flood plains subject to frequent and severe flooding. Now is the time to consider similar land use control in areas where noise is a problem.

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The lands need not necessarily remain vacant. Most commercial and industrial activities can be made to conform to a noisy environment. Many other types of activities can be accommodated through proper site location, building design, and acoustical treatment.

Sometimes the local officials who control land use, planning, and zoning are not aware of the potential noise in these situations. In other instances they are subject to local pressures which are difficult, if not impossible to resist.

Transportation officials must continue to cooperate with local officials, informing them of potential areas of incompatibility, and helping to plan compatible activities. In addition, a national land use policy, with built-in incentives to localities is needed to insure compatible land use development.

The Congress has directed the undertaking of some enormous tasks with the enactment of the Federal-aid Highway Act of 1970. One of these tasks is the development of guidelines to assure that adequate consideration is given to the social, economic, and environmental effects in the Federal-aid highway program.

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One of the specific effects the Congress wanted included is noise. In addition to guidelines, the Congress asked for the development and promulgation of noise standards to assure that future Federal-aid highways would be compatible with various types of land use. Each of these efforts is well underway and there should be no difficulty meeting the July 1, 1972 deadline established by Congress.

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There is great potential in the guidelines and standards efforts for further increasing the highway program's responsiveness to the current concern for the environment. However, great care must be taken to be certain that they are not so severe as to cause a serious impediment to the highway program. We must seek that balance of control, flexibility, and pragmatism which will be effective in reducing the effects of noise and still permit construction of the highway improvements which the public expects.

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The noise guidelines are expected to be a procedure for analysis of noise impacts. Included in the analysis would be: (*a*) Determination of existing noise levels, (*b*) inventory of noise sensitive land uses or activities, (*c*) prediction of anticipated noise levels from the proposed highway project, and (*d*) study of noise abatement alternatives. The results of the analysis would be furnished to the decisionmaker together with the analyses of other social, economic, and environmental effects to provide a more comprehensive basis for making highway decisions.

The noise standards are expected to be numerical noise levels (in decibels using the A-weighted scale) for various land uses and activities. There will be different values for day and night, and there will be both average and peak noise levels. Since many activities take place primarily indoors, and since there is wide variation in types of building construction (causing wide variation in sound transmission loss) different values will be provided for both indoors and outdoors.

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There are several opportunities available for control of noise during the development of a highway project. During the location studies, the potential noise impact of each alternative alinement can be determined. From a noise standpoint, the alinement having the least noise impact should be selected. In other words, if all other effects were equal, the one having the least noise impact should be selected. Of course all other effects are seldom equal, which makes final decisions difficult. The important thing here is to provide the decisionmaker with the greatest possible array of social, economic, and environmental effects (including noise impact) so that the final decision will be a better informed one. In addition, advantage should be taken of terrain and natural and manmade barriers to shield sensitive areas from noise.

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The purchase of highway rights-of-way offers an opportunity to acquire wide buffer zones on either side of highway. A relatively wide buffer area would be required, so it is rather obvious that this approach is limited to those instances where land is undeveloped, fairly inexpensive, and where noise sensitive land uses might someday intrude, so that the houses that you see here with the red *X*'s [indicating] would never get built—not that we would advocate acquiring those homes.

The design of a highway offers additional opportunities for control of highway related noise.

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The advantages of a depressed roadway can be considered. It is unlikely that any roadway would ever be depressed solely to obtain a reduction in noise. However, if a depressed roadway is being considered for other reasons, it should be recognized that the noise level could be reduced by at least half.

The same noise level reduction can be obtained by constructing a noise barrier at much less cost.

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To be effective, the barrier must intercept the line of sight between the noise source and the recipient. The barrier could be an earth dike, a masonry or concrete wall, or other solid massive material. Not many of these barriers have been constructed, but some of those which have are very effective and attractive.

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Landscape plantings are an aesthetic asset to almost any highway setting. A screen of plantings offers psychological benefits (out of sight, out of mind), but very little actual noise reduction. Dense plantings 300 to 500 feet in width can reduce noise levels by half.

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Some noise reduction can be obtained by avoiding steep roadway grades and by holding their length to a minimum. The use of "quiet" pavement surfaces can also provide noise reduction, but on high-speed freeways, there may be adverse effects on safety.

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The accomplishment of all the foregoing measures will not be sufficient to solve every noise problem. New acoustic materials are needed for highway work. They must be durable, attractive, economical, and easily cleaned. In some cases (tunnel linings) they must also be able to reflect light.

We need to find a way to get truck exhaust stacks closer to the ground so that low barriers will be more effective. We need to develop pavement surfaces that are both quiet and safe.

Finally, we need a last resort capability, which could be used when all other techniques are inadequate or uneconomical. Possible approaches might include authority to purchase noise easements or noise rights, the outright purchase of a property, or installation of noise insulation.

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One way to sum up the main items previously stated is to give a recipe for "QUIET."

"Q" Quiet vehicle manufacture.
"U" Uniform numerical noise level laws for States and localities.
"I" Improved land use control.
"E" Evaluation of noise in development of highway projects.
"T" Techniques not yet available.

It should be readily apparent that the highway program and the administrators, engineers and other professionals who conduct it cannot administer this recipe alone. Help is needed from other agencies (both government and private), from industry, and from concerned individuals. We intend to do our share in the highway program, and ask you to do yours.

Dr. **Meyer**. Thank you very much for an illuminated and illuminating presentation. I would like to ask you if you can make it available to us, either Xerox copies or some copies of those illustrations, so they may appear with the printed form of the transcript.

Mr. **Rupert**. Surely.

Dr. **Meyer**. If it's at all possible, I think that they add a great deal to your presentation, sir, and I would——

Mr. **Rupert**. Surely.

Dr. **Meyer**. Like to have them in the record that goes to Congress.*

Mr. **Rupert**. All right.

Dr. **Meyer**. Panel, any questions?

Professor **Kerrebrock**. Is it part of your concern to ask whether a highway should be built in the first place, or should be replaced by some form of mass transit—and if not, whose is it?

Mr. **Rupert**. At the present time this is a responsibility of primarily the State and local governments. We operate largely a grant—in fact, entirely a grant and aid program. We do require that any, that before we can approve any project in an urbanized area, that that project must be based on a comprehensive, cooperative, continuing transportation planning process which has been established in all urbanized areas, and this process is made up by representatives of State and local governments, which make their recommendations as to the transportation facilities that they feel are needed in that particular urbanized area.

Professor **Kerrebrock**. Will you then, in the future, require that noise be a consideration in that preliminary decision?

Mr. **Rupert**. In the transportation planning process?

Professor **Kerrebrock**. Yes.

Mr. **Rupert**. This will be a part of our guidelines——

Professor **Kerrebrock**. OK.

Mr. **Rupert**. On noise.

There will be sections in the guidelines on planning and on project development after a decision is made to go ahead with the project.

Mr. **Hinton**. Mr. Rupert, I thought your presentation was excellent. I am really impressed that the highway administration has such a good handle on this particular problem. I was wondering, are you, in fact, doing these things today, requiring that there be this kind of design consideration made?

Now I notice you were concerned about the effect of the highway construction and operations subsequently on the surrounding areas, and you mentioned building code ordinances, or sound insulation in structures bordering the highway, which I think is a natural requirement, but I don't know of any where this is being done except maybe you might be able to tell us.

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* This material is on file at the Office of Noise Abatement and Control.

Mr. **Rupert**. Well, I might mention that we have really just recently gotten into this program, the whole noise business. In fact, I think this is pretty much true nationwide of all programs.

To date we have done very little that is concrete, and the whole thing really has the full impact of—it has hit us in the last 6 months, since the passage of the Highway Act, and the Congress has forced us to move, and we have recognized that we can't do it all alone, and if the highway noise problem is going to be licked, then most of the items that I have mentioned in my recipe have got to be tackled.

Mr. **Hinton**. I would think there is a tremendous incentive in the provision of highway funds for the State or county, or whatever is doing the highway construction, to take into account these other factors, as an incentive to get the Federal funds.

Mr. **Rupert**. Except usually the highway funds are administered by the States, and the land use control is administered locally. Now, the localities derive from powers from the State, and I guess ultimately you could go that route. It might put a lot of people in very much of a bind.

Dr. **Meyer**. Anybody else? Well, thank you for a very, as I said, illuminated and illuminating presentation. I look forward to working closely with you. I presume that when you said you didn't have much in concrete, you were talking about noise matters, not highways.

Mr. **Rupert**. That's right.

Dr. **Meyer**. Our next witness is Mr. William Carey, the executive director of the Highway Research Board for the National Research Council, who will describe briefly what is going on under a very aggressive effort in this area of noise. Glad to have you here, sir. I am sorry we are a little late, but I am sure you understand our problems.

Mr. **Carey**. It's quite all right.

STATEMENT OF WILLIAM N. CAREY, HIGHWAY RESEARCH BOARD

I am William Carey of the Highway Research Board.

Thus far today, testimony has been directed to the specific problems of transportation noise, and to potential solutions involving technology, regulation, legislation, and the like.

My assignment has been to explain something of the Highway Research Board, its position in the transportation community, its activities related to environmental problems—particularly noise—and its availability as a potential home for certain types of activities that don't readily fit elsewhere.

I think this information, which is included in some detail in my prepared testimony, may have some value to the Panel when it is making its in-depth considerate studies of matters, but the general public in an open hearing, I believe others have more information of more urgent interest.

Further, as it will be clear, I am not in any sense an authority on noise, but rather cover, thinly, if you will, the entire field of transportation research.

The scope and activities of the Highway Research Board of the National Research Council are described. As one of many areas of involvement the Board has concerned itself with transportation noise. Several projects have been undertaken by the Board in this area. One, Transportation Noise Research Information Service involves a computer-based information storage and retrieval system and the preparation of syntheses. The national cooperative highway research program has completed several projects: One on measurement and simulation of noise, one on effects of highway landscape, one a design guide for highway engineers and one on legal implications of noise. The Board's potential for additional work in this area is described.

I have been asked to explain something of the Highway Research Board, its position in the transportation community, its activities related to environmental problems, particularly noise, and its availability as a potential home for certain types of activities that don't readily fit elsewhere.

The scope of the Board's activities is quite specific and quite broad. It states that the Board will:

> Give attention to all factors pertinent to the understanding, devising and functioning of highway and urban transportation systems and their interrelationships with other aspects of total transportation. It will concern itself with the planning, design, construction, operation, maintenance, and safety of facilities and their components; the economics, financing, and administration of the systems and their interactions with the physical, economic, legal, and social environments they are designed to serve.

Less formally, that means we are to concern ourself with every aspect of highway and urban transportation and their interactions with other modes of transportation and other social and economic institutions. We are not involved with air traffic, intercity rail, maritime affairs or pipelines, except as they interact or interface with highways and urban transportation.

The Highway Research Board is a unit of the National Research Council, which is the operating arm of the National Academy of Sciences and the National Academy of Engineering. The Academy is a nongovernmental, nonprofit organization chartered by Congress over a hundred years ago to advise the Government and others on all matters of science and technology. Within the Academy structure, there are several units with concern for the environment; perhaps the most widely known is the Environmental Studies Board that prepared the report on the airport in Jamaica Bay. Many other Academy units are involved one way or another. I am prepared to discuss only the Highway Research Board.

Traditionally, the Highway Research Board, which is now 50 years old, has served as an information transfer agency and correlation service primarily in the field of highway research. Continuing support for its activities comes from the 50 State highway departments, the Federal Highway Administration, and the Urban Mass Transportation Administration of the Department of Transportation, and hundreds of governmental agencies at all levels, industries, universities, and individuals in this country, and roughly 60 foreign countries. The bulk of the support for regular technical activities, about 80 percent, comes from the first-named agencies—the State highway departments and the U.S. Department of Transportation.

Regular technical activities include field visits to highway departments, universities, industrial organizations and others by a staff of highly competent professionals covering all facets of highway transportation, during wich information as to problems and potential solutions is exchanged. Also included are meetings and seminars on a wide variety of transportation-related technical subjects, an extensive committee structure, involving some 120 committees and panels, with over 1,800 members from government, industry, universities, et cetera. This activity includes a library, and an extensive computer-based information storage and retrieval system that covers quite comprehensively American and foreign transportation research literature that relates to highways and urban transportation. This information system also includes coverage of some 9,000 ongoing research projects in our field of interest in the United States and some 58 other countries. Another feature of this program is the publication of some 13,000 pages of technical reports and papers each year. I report these things to insure that you understand that transportation noise, or in fact, transportation vis-a-vis the environment, are important but relatively small parts of the overall Highway Research Board's activities.

In addition to the 50-year-old regular technical activities of the Highway Research Board, we maintain two other divisions that are involved in contract research work. One of these is our Division of Special Projects under which we perform in-house research work under contract to government agencies and others. The other is the national cooperative highway research program that we administer for the State highway departments. In this program the research work is subcontracted to outside agencies.

In its special projects division, the Board undertakes work of a type particularly suited to the National Research Council. It does not compete with the research community at large, in fact, it will only propose on a sole-source basis. Much of the work in recent years in this Division has involved the development of information systems. Included is the highway information system mentioned above, a transportation research information system for DOT, a safety information system, a maritime research information system, and a transportation noise information system about which we will speak later. The information activities of this Division involve worldwide international exchange. The Board is the American center for a very extensive international network on transportation research information.

In the national cooperative highway research board program, the board subcontracts about $2.5 million per year of research on a wide variety of problems. The problems are selected by the sponsors, the State highway departments. Once problems have been chosen, the Highway Research Board advisory panels write requests for proposals, review proposals, select research agencies, monitor the research, and review final reports. This program has been in operation for roughly 8 years; to date, some 176 research projects have been undertaken at an overall cost of $19 million; 117 reports have been published. Some of the work has been in the area of highway noise. I will discuss it later.

I have taken so much of your time to describe the general nature and functions of the Highway Research Board in order to place in context our activities related to transportation noise and because I believe that there may be other environmental concerns where transportation is involved that would lend themselves to study within this organization. The National Research Council and its units have a reputation for objectivity and freedom from bias that makes them ideally suited for work in which many Government agencies must sit down together and in which men and women from widely different disciplines can talk to each other freely and openly. No empires are built here. Good people are attracted to serve on Research Council committees and they concern themselves with the issues. I do not suggest that there could not be some other place where these things could happen—only that I know from personal experience that they do happen in the National Research Council and in the Highway Research Board. Of course, I know that there have been exceptions where all was not sweetness and light; perhaps they were needed to prove the rule.

Now in the framework that I have described, I would like to tell you about the specific activities of the Highway Research Board related to transportation noise. One important project that is being done in-house under our Special Projects Division is the Transportation Noise Research Information Service (TNRIS). The TNRIS program involves the creation of a computerized information storage and retrieval system containing résumés of research projects, abstracts of research reports, articles, and other documents related to the general subject of transportation noise. New additions to the TNRIS information file are reflected in the semiannual HRB publication called "Transportation Noise Bulletin." The first or developmental issue of the "Transportation Noise Bulletin" was published during March of this year and received a very favorable response from people in this country and abroad who are working on the transportation noise problem. Regular publication of the "Transportation Noise Bulletin" will begin on a semiannual basis this fall. A copy of the developmental issue has been filed with my testimony. This issue is out of print, but the complete file will be reproduced in the first regular issue this fall.

Another function of the Board's Transportation Noise Research Information Service is to draft and disseminate special information synthesis reports on selected aspects of transportation noise. The reports seek to define the state of the art of the subject matter covered by the synthesis study and to provide a benchmark for the implementation of policies and procedures. The preparation of the first of these synthesis studies on transportation noise is currently under way. It deals primarily with motor vehicle and traffic noise measurement. Additional synthesis studies on other topics are contemplated.

The various activities of the Transportation Noise Research Information Service are guided and assisted by the Board's Advisory Committee on Transportation Noise. This special committee is composed of 11 experts in the transportation noise field. In addition to its advisory role with respect to the TNRIS program, it is charged with the responsibility for developing recommendations for research and development activities that may lead to the implementation, within the transportation community, of policies, standards, and procedures for alleviating transportation noise. The recommendations of the Advisory Committee are directed primarily to the Office of Noise Abatement of the Office of the Assistant Secretary for Systems Development and Technology of the U.S. Department of Transportation which provides financial support for the TNRIS program.

Another major activity of the Highway Research Board related to noise may be found in the national cooperative highway research program described above. You will recall that this program is administered by the Board and supported on a continuing basis with funds from the State highway departments. Over the past few years, the NCHRP has supported several major contract research efforts related to the general subject of highway noise.

One of these NCHRP studies dealt with highway noise measurement, highway noise simulation and indices of human response to highway noise. Also included in the report of this study are comments on major motor vehicle noise sources and comments on legislative attempts to control motor vehicle noise. NCHRP report No. 78 on this project has been filed with the EPA and copies are available at the Highway Research Board.

Several other NCHRP studies have concentrated on other aspects of highway noise. One of these studies (see NCHRP report No. 75, filed with the EPA and available at the Highway Re-Research Board) examined the effect of highway landscape development on nearby property by correlating highway design and landscape treatment, property valuation and community interview data with headlight annoyance, noise, vibration, and air pollution. The study report concluded, not surprisingly, that truck noise is the most objectionable highway disturbance to persons living next to limited-access highways. Another NCHRP study reviewed the legal implications of the valuation and compensability of highway-generated noise, pollution, and other environmental factors. That study concluded that under American law, there can generally be no recovery for damages which are caused by highway-produced noise, air, or water pollution—or other similar environmental factors—unless a portion of the landowner's property is actually taken for highway construction. This report has not been published but a draft copy has been filed with the EPA.

Just within the last few days, the report of a fourth NCHRP study of highway noise was released. This report provides a design guide for traffic noise prediction that is arranged in "cookbook" rather than acoustical textbook form, so that the highway designer with no experience in acoustics will be able to use it readily and effectively. The design guide is intended to provide the highway planner with a means for assessing how the introduction of a new highway will influence the noise environment near the proposed highway and for assessing how people living or working near the highway will react to the new noise environment. This report, NCHRP No. 117, is also available and has been filed with the EPA. In addition to the report, a "highway noise" tape recording has been produced to assist engineers in their understanding of how different noise levels are heard, what the significance is of changing noise levels by various amounts, and how motor vehicle noise varies with traffic flow conditions. Loan copies of the tape recording, "Illustrative Recording of Traffic Noise," are available on request from the Highway Research Board.

Finally, a fifth NCHRP study of highway noise is currently under way. At least in its initial stages, this study will involve field evaluation of existing traffic noise reduction measures at a number of specially selected sites around the country.

A third major activity of the Highway Research Board related to noise is reflected in the work of the Board's standing committees in its regular technical activities division. As mentioned above, these committees, which include within their membership over 1,800 of the Nation's top transportation administrators, engineers, social scientists, and educators, are engaged on a continuing basis in identifying and evaluating research needs and findings. The committees also serve as a focal point for the preparation and publication of papers and for the mutual exchange of information.

A number of these committees have become involved in recent years with various facets of highway and urban transportation environmental impact. A list of Highway Research Board committees that encompass the question of noise within their scope would include, in addition to the Advisory Committee on Transportation Noise mentioned above, the following: The Committee on Social, Economic, and Environmental Factors of Transportation; the Committee on Geometric Highway Design; the Committee on Roadside Development; the Committee on Environmental Issues in Transportation Law; and the Task Force on Highways and Environment.

Finally, a fourth major activity of the Highway Research Board related to noise involves the Board's continuing program of special meetings, workshops, and conferences. Earlier this month, for example, the Board held a 3-day environmental workshop cosponsored by the American Association of State Highway Officials and the Federal Highway Administration of the U.S. Department of Transportation at the National Academy of Sciences building in Washington.

The efforts of this environmental workshop were divided by subject matter area among eight panels, one of which was devoted to noise. The noise panel issued a report in which it discussed draft guidelines on highway noise that had been prepared by the Federal Highway Administration under the authority of section 136 of the Federal-Aid Highway Act of 1970. The noise panel also made detailed technical recommendations concerning these guidelines and issued a number of general recommendations, including a recommendation that Federal standards be set for motor vehicle noise and that States be required, as a prerequisite for obtaining Federal-aid highway funds, to enact legislation which adopts standards and which establishes an appropriate enforcement program.

The noise panel also recommended that highway departments should seek participation in cooperative planning and zoning efforts with appropriate local authorities in order to prevent the development of noise-sensitive land uses near highways. The panel suggested that State highway departments might seek State legislation requiring vendors of property near highways to notify prospective buyers of the existing and predicted future exterior noise levels on such property, if these noise levels exceed the noise standards to be established by the Federal Highway Administration.

The report of the environmental workshop is currently being prepared and will be published by the Board later this year. In addition, plans are now being made for a 3-day conference on highways and the environment to be held next summer in Madison, Wis. At this stage in the planning, it appears that noise will again be a major subject for discussion.

In closing, I would like to thank the Environmental Protection Agency for the opportunity to describe the work of the Highway Research Board. Although I am not equipped to discuss the technical content of the reports of our research work that I have mentioned, I would be pleased to answer any questions related to the Highway Research Board, the National Research Council, their methods of operation and their potential for work in these fields.

EXHIBITS TO ACCOMPANY TESTIMONY OF W. N. CAREY, JR., HIGHWAY RESEARCH BOARD

1. Transportation Noise Bulletin—Developmental issue, March, 1971.
2. NCHRP Report 78, Highway Noise—Measurement, simulation, and mixed reactions.
3. NCHRP Report 75, Effect of Highway Landscape Development on Nearby Property.
4. NCHRP study (unpublished), Draft Report on Legal Implications of the Valuation and Compensability of Highway Generated Noise, Pollution, and Other Environmental Factors.
5. NCHRP Report 117, Highway Noise—A design guide for highway engineers.
6. The Highway Research Board—What it is and what it does.
7. Publications of the Highway Research Board.
8. NCHRP—Description of this program.

Dr. MEYER. Thank you very much, Mr. Carey, particularly not only for your presentation, but for the material you have submitted, all of which we will incorporate in the record.*

Also I would like to request that we might be furnished, when it becomes available, with a copy of the report on the 3-day conference that you mentioned.

Mr. CAREY. Very well.

Dr. MEYER. We would like to, sometime in Washington, arrange for our staff to get together with you so we might listen to this tape, because we have had a lot of interest and inquiries directed to us. Panel, any questions?

Professor KERREBROCK. I have one very quick question. Could you estimate how much is spent on highway research in the United States?

Mr. CAREY. On highway research, yes; the question was how much is spent on highway research in the United States, and if you exclude planning, of which by and large is an operational matter, then it's only around $30 or $40 million spent by public bodies. There is a good bit more spent by industrial organizations.

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* This material is on file at the Office of Noise Abatement and Control.

It's interesting that just about the same amount is spent abroad as is spent here, and all other countries.

Dr. **MEYER**. Thank you very much. Our next witness is Dr. Starkman, but some members of my panel have requested that we take about a 5-minute stretch break in order that they may stand up and relax for a minute, and take care of any environmental needs that they may have.

(Short recess.)

Dr. **MEYER**. Dr. Starkman, thank you very much for realizing that we do have some human environmental problems in the panel, sometimes, and I am very pleased to welcome you here to testify before this group regarding the activities of a major segment of the transportation industry relating to automobiles and heavy transportation. We are grateful for your patience and understanding of the reason we are behind schedule so without taking time away from you, sir, I will invite you to give your information to us.

Mr. **STARKMAN**. Thank you, Dr. Meyer.

First we should correct that "doctor."

That "doctor" is neither earned or deserved.

I am Ernest Starkman, and vice president for environmental activities, rather than engineering, at General Motors.

Dr. **MEYER**. We have some problems, sometimes, with getting these typographical things correct.

Mr. **STARKMAN**. I have prepared a statement which has been distributed to you. It's much too lengthy to take your time to read in its entirety here, but what I will try to do is instead review the high points of the statement extemporaneously, if I may, and then I will ask, if you would like, that I answer questions.

Dr. **MEYER**. Yes, sir; your statement will be included in the record, and as I mentioned earlier with other witnesses, the panelists will be reviewing this material for the Government, and we will be collectively reviewing it, so your time in putting it together has not been lost.

STATEMENT OF ERNEST S. STARKMAN, GENERAL MOTORS

Mr. **STARKMAN**. Mr. Chairman and members of the panel, my name is Ernest S. Starkman and I am vice president in charge of environmental activities staff for General Motors. I am here in response to your invitation to discuss General Motors' efforts to reduce noise from new motor vehicles.

General Motors welcomes this opportunity to comment on the problems of transportation noise and its control. We have been involved in product noise control for many years, and thus have considerable experience in both interior and exterior quieting of a wide range of motor vehicles, off-highway equipment, railbound vehicles, and stationary devices of many sorts, as well as in test and measurement methodology.

My comments today will be confined for the most part to those areas specifically requested in the invitation to this hearing; namely, the sources of noise from motor vehicles, the current status of vehicle quieting, as well as the economic cost of meeting various vehicle noise standards.

Much of my commentary depends upon and is measured by existing noise test methods and existing or imminent noise regulation. My remarks do not necessarily mean that GM endorses these methods or the regulations. We feel that there is a real need to improve measurement and assessment techniques and to devise methods which can be more representative of actual vehicle operation in the community. But first, let me turn to the various sources of motor vehicle noise and their relative significance.

At this point I want to emphasize that for the moment we are discussing technological considerations only; the role played by economics will be discussed later.

Sources of Motor Vehicle Noise

Heavy Trucks

Since most of us consider heavy highway trucks to be a prominent source of transportation noise, allow me to rank the sources of noise from heavy trucks by typical sound and intensity, as follows: Engine exhaust, cooling fan, tires, engine and power train, and aerodynamic and load noises.

Exhaust noise is the predominant problem for the trucks now in use, but it can be controlled adequately, we believe, although at some cost penalty to owners, to meet current noise regulation. Exhaust noise on new heavy duty trucks and truck-tractors has been controlled at the factory with mufflers designed for the truck, as opposed to other mufflers which the customer may require in his purchase specification. Consequently, exhaust noise on new trucks as designed does not represent a significant part of the problem.

As future noise limits are lowered, noise from the engine cooling fan, which is now overridden by exhaust noise, will become identified as a major source. However, the control of fan noise is not as simple and straightforward an engineering problem as the exhaust. Consequently, we anticipate considerable added engineering effort in the near future to determine how to accomplish this.

A conventional approach to reduce fan noise is to increase the fan and radiator sizes and to turn the fan at a slower speed; however, for present truck designs, the fan and radiator are already as large as can be accommodated practically, and any reduction of fan speed would precipitate cooling problems.

Other control methods are now under experimentation, and shrouding or ducting the fan appears promising. Unfortunately, these alternatives will require more space and none is available in the most popular tractor-trailer configurations used today. These short-cab units have been designed to take advantage of every bit of space to provide more payload. If the amount of space which is necessary to minimize fan noise is used, it must be taken from the trailer length.

At highway operating speeds, noise from tires is in many cases one of the major sources of truck noise. The problem is further complicated by the large number of tires mounted on typical highway trucks and truck-trailer combinations. In Michigan, for example, many combinations run on 42 tires. The wide range of tread designs produces a variation of noise-producing characteristics involved. Even for the quietest designs, noise from the tires alone at highway speeds can be about the same or even greater than the noise from all the other properly controlled vehicle sources combined.

For comparison purposes, a conventional tractor-trailer combination which meets 88 dBA under SAE test conditions with all systems operating normally and with 18 "quiet" tires will produce 85 dBA even when coasting by at 50 m.p.h. with the engine off.

Most significant on the subject of tire noise is the fact that the present so-called quiet treads do not have as much traction and therefore as much safety in stopping as do the noisy and longer lasting crossbar treads. Thus, lower noise levels at the moment may be achievable, but perhaps at the expense of some safety. There are several studies of this problem now under way by the Society of Automotive Engineers, tire manufacturers, and under Department of Transportation contract.

Mechanical noises from the engine and other power train components will become significant when the other sources which are now more prominent have been reduced. Particularly for diesel engines, noise radiates from the combustion process and from internal mechanisms. As we testified at the Atlanta regional EPA hearing, we have identified 12 separate sources of diesel engine noise in research recently conducted at the noise and vibration laboratory at our Milford Proving Ground in Michigan. As part of the tests, experimental changes were made to the engine to explore the possible methods of silencing each source. Although some of the results show promise, no single change applied to these 12 sources made a discernable difference in total engine noise.

Gear engagement may lead to noises from the transmission or differential assemblies, although this is typically not a problem at our current stage of noise control and gear production methods.

Finally, at highway speeds, aerodynamic, or load noises—such as rattling of chains or cargo—can be apparent, though typically not a significant contributor to the noise level of most truck operations.

The relative magnitude of the engine-initiated sources for a large diesel-powered truck is shown on figure 1. The levels were obtained during a standard passby test and are the maximum values measured at a distance of 50 feet.

Alternatives for Truck Noise Control

Presently, available control techniques for exhaust noise are sufficient to hold the maximum level to 88 dBA. By roughly doubling the muffler volume and weight, exhaust noise can be further reduced. At this point, the cooling fan noise predominates and limits the level at 86 dBA. In experiments performed for such purpose, we have found that by removing the fan entirely (and with additional muffling), a level of 84 dBA can be obtained. Under these circumstances, the noise level is essentially controlled by other factors. It should also be remembered that tests to evaluate these alternatives are conducted under SAE J366 procedures which do not involve significantly tire noise at higher speeds.

Accomplishments on Trucks

In the area of truck quieting, General Motors installed larger and more effective mufflers on all such vehicles in 1954. This program involved use of the so-called 125 sone standard. It was the result of several years of study and development by truck manufacturers and truck operators through their respective trade associations. Under the program truck manufacturers sought to improve new trucks with respect to noise. This gave new truck purchasers an option to buy quieter trucks if they wished.

In 1967, California law required that new trucks meet a specified decibel limit, which although higher to begin with, is now enforced at 88 dBA. GM trucks for California sale and use are designed to comply with that limit.

In addition. General Motors has developed an optional package which is now in use to provide a significantly quieter chassis for refuse collection vehicles. This package comprises a muffler of roughly double the volume of a standard muffler, a full-length tailpipe, a more effective induction silencer, and acoustical treatment and seals for the engine compartment.

Passenger Cars

For the largest single class of motor vehicles—passenger cars—the ranking of noise sources is: Exhaust, induction, tires, cooling fan, engine and power train, and aerodynamics. Although the problems are somewhat different, control of these sources is much like those from heavy trucks.

The relative levels for various sources on three different automobiles are shown on figure 2. These levels were obtained during the standard passby noise test and are maximum levels at a distance of 50 feet. It is apparent, in comparing data from these three cars, that levels achievable through control of exhaust noise vary widely among vehicles, as do induction and engine noise levels.

Alternatives for Control of Passenger Car Noise

Using present technology, exhaust noise can be controlled to meet presently existing noise regulations.

In the tests which produced data for figure 2, just referred to, typically, one or two mufflers were serially added to these test vehicles to reduce the exhaust noise, whereas induction noise was controlled by larger and more effective air cleaners, which acted as silencers.

While additional mufflers can be added experimentally for special test purposes, incorporation of such additional devices on production vehicles will add cost and necessitate redesign of the vehicle underbody because of space and possibly some weight requirements.

It is expected that cooling fan and engine and power train noise will not be a special problem for passenger cars to meet the present and near future requirements.

Noise emanating from the tire-road interface, which is the controlling factor during highway cruise conditions is at somewhat of a technical impasse at present. This impasse, again, is for reasons of the traction-noise conflict discussed previously for truck tire noise.

Accomplishments on Passenger Cars

The range of noise levels for various operating modes of a typical passenger automobile are shown on figure 3, levels for cruise, or steady speed, conditions are seen to be much less than those for full-throttle acceleration. Also, steady-speed noise levels above 45 m.p.h. or so are controlled almost entirely by the tires. For such conditions, present exhaust silencing appears to be adequate.

Because vehicles with quiet interiors have an obvious appeal to the purchaser, control of passenger car interior noise has been a major concern for many years. It is felt that our passenger cars represent no problem in this respect. However, this effort has had a double benefit, for control of vehicle interior noise usually has been accompanied by reduced exterior noise as well.

Again, our passenger vehicles sold in California are designed and developed to meet the new vehicle noise law in effect there for new vehicles, with many vehicles significantly below the maximum levels specified. Also, the California standards, both for new vehicle and passby tests, constitute a significant factor in the design requirements for all General Motors vehicles manufactured for sale or import into this country.

As a final observation on passenger car noise control we have tested several models of our 1971 cars with dual exhaust systems, which systems our customers can purchase as items of optional equipment, depending upon the make and model. In most of these cases, these cars have passby test noise levels of 80 dBA or less. In such cases, it is clear that the additional noise reduction derived from use of the dual exhaust system is directly related to the additional cost to the purchaser of the extra equipment.

Buses: Controls, Accomplishments

Regarding buses, the order of significance of sources is: Cooling fan, engine and power train, exhaust, and possibly tires. The problems of control of these sources are the same as for heavy trucks.

The recently developed environmental improvement package (EIP) for our diesel transit coaches, which was demonstrated to the Department of Transportation last year, although intended principally for reduction of exhaust emissions and odors, provides up to a 10-decibel reduction in interior noise levels. This package comprises revised intake and exhaust ducting at the rear of the coach, revision of the engine compartment, and slight modifications to the engine itself.

Having enumerated the various noise sources and what has been done to control them, let me next discuss the research and development work being done at General Motors for further noise control.

Research Programs

Noise is certainly a major consideration in the evaluation of advanced vehicle and powerplant concepts. Over the past several years, General Motors has produced a variety of experimental vehicles with unconventional powerplants: Stirling-cycle, electric, hybrid gasoline/electric, steam and, currently, the rotary engine. The noise emissions of each such experimental engine are the subject of a close evaluation and study. Unconventional or different concepts for exhaust silencing have also been researched, with several designs currently under evaluation.

Engineering effort is also being directed to finding the lowest noise levels possible with existing product designs. As mentioned previously, control of exhaust and induction noise from new vehicles, both car and truck, can be handled with present technology, at least insofar as future reductions in noise levels now required by law are concerned.

Control of radiated noise from the diesel engine itself still remains a significant problem. Means of engine encapsulation or enclosure, and structural modifications of the engine block, are being investigated.

Similarly, the noise from the large cooling fans used on trucks and buses is a problem of some magnitude. Investigations into ducting and shrouding concepts, as well as new engine cooling techniques, are being conducted.

Studies are being made into the noise-generation mechanisms of tires, for both passenger cars and trucks, in order to devise means for reduction of this particular noise source. At the present time, however, it appears that traction and handling requirements are inconsistent with noise reduction requirements of tires. There may be additional tradeoffs and compromises in this area than the ones presently seen. But as of today, even the interactions of the varying factors about which we do have some knowledge are not yet fully understood.

Economic Factors

Passenger Cars

Although in some instances the engineering methods have been identified which are necessary to achieve the limited noise reductions discussed previously, the costs and other economic considerations have not been defined. This is true of current models, using known engineering methods to achieve the limited noise level reductions now spelled out in existing law. It is even more true of future models, where control techniques and hardware necessary to achieve the extremely low noise levels being proposed and promulgated by various State and local governments, are basically unknown.

However, it is clear that the implementation of even known technology to achieve lower noise levels on future models will increase the price the consumer pays. This, we believe, is illustrated by dual muffling systems on many of our 1971 models with 8-cylinder engines which approach 80 dBA in a passby noise test. This experience suggests that if 80 decibels is to be the objective for passenger cars, then use of current technology, or dual exhausts, on passenger cars is likely to increase costs to purchasers significantly. While costs of optional equipment are not completely representative of costs when the same item becomes standard equipment, they are of comparative value. In the case of a Chevrolet Impala, the dual exhaust option has a manufacturer's suggested retail price of $30.55 (includes Federal excise tax).

Finally, it is also likely that replacement costs for such dual systems will be greater than for the conventional single system.

Added Cost Due to Air Pollution Controls

The added costs of mandatory air pollution control systems will compound the costs made necessary to meet lower noise standards. In addition to other controls, General Motors believes that a catalytic converter will have to be installed on the exhaust system in order to bring hydrocarbons and carbon monoxide within the 1975 Federal standards. Since exhaust emissions may have to be processed through a catalytic converter in order to comply with air pollution standards, it follows that dual exhaust systems for noise control in turn are likely to require dual converters.

While the exact cost of these converters cannot be fixed at this time, due to development work with catalysts which is now in process, the magnitude of cost can be identified as significant.

The foregoing is true of mass produced passenger vehicles generally. However, there are two cases involving commercial vehicles where limited price data are available for noise control efforts by General Motors:

1. The environmental improvement package for 8-cylinder diesel transit coaches is priced at about $373 (current prices without Federal excise taxes) when installed on a new coach. Retrofit to coaches in the field costs considerably more. To convert a used 8-cylinder bus, the materials alone cost $1,300 (current prices without Federal excise taxes), and require averagely 160 man-hours of labor to install.
2. The optional quieting package for the New York City refuse truck chassis added about 1 percent to the price of the chassis.

Obviously, this is not an appropriate yardstick to apply to all noise-control measures on all vehicles.

Heavy Trucks

We anticipate that the noise level of almost all heavy trucks can be reduced to about 82–83 dBA: (1) Using present technology, (2) tested according to SAE J366 procedures which basically evaluate vehicle noises and not tire noises, (3) if present State length laws for combination vehicles are liberalized, and (4) requiring significant although not yet finalized additional costs. For vehicles to be below that level, a new vehicle design and more sophisticated silencing concepts with longer leadtime requirements and higher costs will be required.

Costs of Use and Maintenance

It should be recognized that the total costs are more than just those borne by the consumer at time of purchase. The additional space or possible additional weight required by more extensive noise control equipment and changes to associated components can lead to reduced payload capacity and reduced roominess. Also, because of these factors, vehicle operating costs may increase. For vehicles used in commerce, this increase in operational cost is ultimately paid by the consumer. Finally, and equally important, maintenance costs for all owners will be higher.

All such factors must be considered when determining the cost/benefit ratio for increasingly restrictive noise level requirements.

Mr. Chairman, that completes my discussion of the items specifically requested of General Motors. May I now discuss briefly some important aspects of the problem which are relevant to the purposes of this hearing.

Responsibility for Noise Control

The problems of abatement of transportation noise cannot be solved by any one group. They can, in our judgment, only be solved through cooperative efforts of all parties involved: The manufacturer, the operator, and the affected governmental bodies.

1. Designing and constructing a vehicle to meet the demands of the market and the law are the responsibilities of the manufacturer.
2. Operating the vehicle within the confines of commonsense and concern for the citizenry, as well as maintaining it for proper mechanical operation, are the responsibilities of the owner and operator.
3. Necessary governmental activity ranges from local to national and involves many different functional agencies: Planners who arrange for the placement of transportation systems within the populated environments, legislators who provide both money and authority for establishing standards which are essential for noise abatement, and finally, police or other regulatory agencies who enforce the standards in use.

Because most vehicles are mass produced at one location and sold for use in other States or throughout the country, it is advisable that the manufacturer be regulated by only one noise standard established at the Federal level and recognized by all State and municipal governments. The alternative to uniform national noise standards would be the profusion of varying and conflicting State standards which would impose serious cost penalties on the manufacturer.

In automotive safety and emission areas of regulation, Congress has recognized this point and has sought to preempt the States in those fields of law. It seems reasonable to us that preemption should also apply in the field of noise regulation. However, there are two cases in which State action is not only appropriate but essential in the enforcement of either State or Federal noise standards: (1) The periodic inspection of equipment in use, and (2) enforcement of whatever passby or operator standards are promulgated.

Having discussed who is responsible for transportation noise abatement, may I now explain how General Motors recommends the problem be approached.

Priorities

Necessarily, this must begin with a complete definition of the problem. Much of the data for this definition is already available and needs only to be coordinated, and examined to see what is yet missing. With all this information, the major elements of the problem can be identified, whether poorly maintained vehicles, operators who blow their horns needlessly or cause tire squeal, hotrods, trucks, motorcycles, or misplaced highways. This will permit the establishment of priorities so that the most essential control efforts can be taken first.

Test Procedures and Regulations

Finally, any attack on transportation noise must be made on the basis of valid test data and procedures. As I emphasized in the beginning, General Motors feels there is a need for better and more representative measurement techniques. Present statutory regulations are structured around tests of new vehicles in near-maximum noise emitting conditions—but as individual vehicles and at lower than top highway speeds. And yet, one of the significant aspects of the larger vehicle noise problem may not be controlled nor influenced by compliance with the current type of vehicle noise regulation. I speak of the composite result of many vehicles operating at or near top highway speeds. The relatively high level of environmental noise which comes from a heavily traveled expressway may or may not respond completely to regulation of individual sources of noise on a given vehicle, or to maximum noise emission regulations of a given type of vehicle.

The effectiveness of individual vehicle regulation may also depend upon a more accurate evaluation of what is meant by the "annoying aspects" of vehicle noise, as opposed to noise that may provide high readings on our measuring instruments and yet is not annoying. I have purposely refrained from use of the term "annoying noise" until now, because it is subject to so many meanings. However, I mention it here because it is an important part of the problem and as such should be a key factor in any national regulatory effort.

Research on this subject is nearly completed under sponsorship of the vehicle manufacturers, by eminent noise specialists at Bolt, Beranek & Newman. Thus, the attempt has at least been made to identify the annoying elements of total environmental or collective traffic noise. Hopefully, by process of elimination, the study will also show those noises that are not annoying.

Once these data are available, they will offer guidance as to which elements of vehicle noise may be critical to the public: (1) When a single vehicle passes, or (2) when the environmental noise of high traffic volume is present. When this has been established, vehicle regulation may be prepared so that environmental noise can be expected to respond.

Having said this, I still recognize the validity of trying to lower the total traffic noise level by reducing the contributing share from each vehicle. What I've suggested, is that regulating the individual vehicle may not be valid to control all degrees of the collective noise of high volume, high speed traffic.

Summarizing this point, it appears reasonable to us at General Motors that the desire to reduce total vehicle noise, by whatever method or approach, should not be directed: (1) To levels which are below those established as the minimum in the environmental sense, which can be influenced by individual vehicle performance; and (2) when identified, to aspects of measurable noise which are not annoying.

Conclusion

This presentation has touched only briefly on a few of the facets of the abatement of transportation noise as related to the production of new vehicles. While General Motors is vitally interested in finding solutions to the entire problem, of necessity our experience has taken us only briefly outside of the new vehicle field. I have endeavored to explain the sources of, and possible solutions to, vehicle noise with both current and future appraisals. For what they are worth, I have suggested methods of reducing vehicle noise levels which General Motors believes to be technologically worth considering. And, as requested, I have attempted to alert the panel to the elements and magnitude of costs which ultimately must be added to new vehicle prices and maintenance in order to achieve lower noise levels. Finally, I have raised what appear to be serious problems yet unresolved in the test and evaluation areas.

Because of the changes required to control vehicle noise, it is unlikely that there will be substantial costs to be added to the price the consumer must pay. Noise control is being considered to protect the environment, and from our experience, it seems unlikely that consumers will voluntarily demand reduction in vehicle noise. In order to achieve the objective, either consumer incentives to purchase optional noise control equipment voluntarily will be required or, as in the case of air pollution and safety, Government regulation which makes such installation mandatory.

At General Motors, we are appreciative of this opportunity to contribute to these hearings. If you wish, Mr. Chairman, I will now be happy to answer any questions that I can.

Thank you.

Mr. STARKMAN. Fortunately, Mr. Rupert covered some of the points on trucks, and this helps quite a bit.

I think that General Motors is known to be a manufacturer of many kinds of mobile, as well as stationary equipment, which noise can be a consideration.

Today I am going to keep my remarks, however, on the matter of transport equipment, road-based, if you will, trucks and motor cars and buses, and because it has been pointed out, the truck in the main seems to be a target for noise source, seems to be that source of noise in the highway which most people are aware of, so we will start with the truck.

The truck has, generally speaking, a number of important sources of noise, the most prominent of which—and with which you are familiar—the engine exhaust; second, the cooling fan; the tires; the engine and power train as such; and then the aerodynamic and load noises. By "load noises" I mean noise created by loose load or chains or other parts that connect the load to the vehicle itself.

Exhaust noise is the most predominant problem, and in brief, exhaust noise can be contained, and it has been within the industry —at least our corporation designs its trucks to accommodate the laws existing in the State of California and applies these same design principles and constraints to its vehicles throughout the rest of the United States.

This means the provision of more muffling than might at first have been the case had there been no restraints placed upon noise from trucks.

One can go further in constraining the exhaust noise by adding more mufflers, or larger mufflers, doubling the capacity, carrying exhaust pipes to the rear end of the truck, and doing other things with the exhaust which will decrease that intensity.

Now, if this is done, then, the next predominant level of noise that one hears usually is that from the fan.

As you know, the cooling system, the coolant cooling system on a truck, the so-called radiator and fan are much more extensive and closer to design limits in a truck than they are in a passenger car, so if the fan becomes a source of noise, one has to look for ways of decreasing that noise, and this involves reducing the speed of the fan, or adapting the fan or reducing its noise through ducting.

The other items which I have made reference to, particularly that of tires, when one gets the fan and the exhaust under control down to the limits where they no longer predominate, then the next source of noise is tires, and here there is a real dichotomy, a problem arises from the fact that with presently designed tires, those tires which show the greatest traction or braking capability also unfortunately seem to be those which make the most noise.

We are somehow going to have to solve this problem of providing both for safety and for low noise levels.

I think you are aware that some of the trucks, particularly in the State of Michigan, have over 40 tires on them. This can be quite a source of noise.

We are faced further by problems of the engine itself making noise. I am not going to dwell on this because at your Atlanta hearings you had someone from General Motors who discussed this point specifically, but this would be fourth in order.

If one wishes to get into the 80-decibel range from trucks, one can, however, get down into the mid-80-decibel range with containment of the exhaust system, and with some quieting of the fan.

The buses have the same kind of problems as trucks. They could be named in approximately the same order. There has been provided, particularly by the General Motors Corp., a kit, an environmental kit, which is not only for noise, but for other reasons, that attach to buses, and this serves also the quieting of the bus noise, particularly for the inside, for the passengers in the bus, to the extent of as much as 10 decibels in some of the retrofits that have been made.

If you will turn to figure 1 at the end of the material I have supplied, I think you will see there that if one eliminates the exhaust in a typical truck, say, that has a total noise output under normal testing procedures, the SAE J366 procedure, one finds that the total noise at an 88-decibel level can be reduced by containing the exhaust to the order of about 86, where the fan becomes predominant, and when the fan noise has been reduced by eliminating the fan, one finds, then, that the engine predominates; in this particular truck, the level of about 84, so these are the present technological capabilities with means we have on hand, although it would take some investment to accomplish these levels.

Turning to passenger cars, of course, this constitutes the largest single class of vehicles on the road.

The noise, in order of decreasing level of intensity, is first the exhaust; then the induction system; the tires; again the cooling fan seems to be about fourth in order, noise directly from the engine, power train, and finally the aerodynamics of airflow around the vehicle itself.

The control of these is somewhat similar to control in the heavy duty vehicles.

One can accomplish some decreases in the noise level from passenger cars by applying more constraints upon the exhaust system, and one thing you may be interested in is the difference between, as an example, a dual and a single exhaust.

By providing on the same vehicle and same engine a dual exhaust system, one can gain a slight bit in noise levels.

Now, I think you recognize that by doing so you have increased the cost to the consumer, and this price on our vehicles is a differential of about $30, if you can separate it out. It's difficult to separate all these factors, but one cannot stop there and there alone and say, "Well, fine, we will put dual exhausts on all our cars."

At General Motors, at least, we think we are going to have to have a catalyst on the exhaust system to control the vehicular emissions for 1975 vehicles. If that be the case, the dual exhaust system will require two units of catalysts, and you will see the situation begin to multiply.

One also has to think ahead with respect to the placement of not only a dual catalyst, but enhanced exhaust silencing system beyond the present kind of mufflers we have—perhaps a dual muffling system on each exhaust pipe, and I guess what I am saying is that we can gain quite a few decibels, as many as 7 or 8, by going to complex silencing systems on vehicles. But the systems do not look like what we have today. They are more complex, more complicated.

I don't want to dwell too long—I said I would only take a few minutes—I think that the consideration that General Motors has with respect to the thrust of these hearings that are taking place are numerous.

I think that in the main, General Motors would like to see a unified system for establishment of limits on vehicular noise emissions, rather than attempting to accommodate various and sundry kinds of noise limitations from various parts of our body politic.

We are not happy with the present methods of determination of vehicle noise. We think that perhaps the means by which we measure noise, particularly from passenger vehicles, may not be representative of the kind of reaction which the public, particularly in the vicinity of throughways, multiple highways, may be exposed to.

The determination, as an example, under SAE procedures, from the noise from passenger cars may not be reflective of the kind of noise which is generated by 10 to 100 passenger cars passing at a particular point, and we believe, therefore, that there is considerable development yet necessary in the area of means for measurement, and instruments for measurement before we really have a good handle on the problem of noise, and before constraints are placed very tightly upon noise.

I think that I should close, and for emphasis, by saying that anything which is done to lower the noise contribution from an automobile should be done with full knowledge of what the other sources of noise are contributing to the environment.

There are tradeoffs involved. One must take into account these other sources, and I am not going to point fingers at other sources, but one can say, as an example, that the individual driver in the way he operates his car makes a difference in the way the person standing on the corner, or living in the house along the freeway, will be exposed to that automobile, or that motorcycle, or that truck, whatever it may be.

It's our function to build the vehicles. It's the function, we believe, of the Federal Government to establish the kind of controls which should be established if they are to be established.

And finally, it's the function of the local political bodies to enforce those constraints when they have been developed.

I thank you for the opportunity to appear here, and I am opening myself, if you would like, to questions you may have, and I hope I can answer them.

Dr. MEYER. Well, thank you, sir. I have a feeling that you are going to get a question or two, and I certainly appreciate your overview of this excellent prepared statement that you have here. And in glancing through it I see it has a wealth of information that is going to be most useful. I will now ask the panel if they have any questions. Panel?

Dr. WHITCOMB. Yes. Thank you. I would like to open with a series of questions to make sure that I am getting at the right question ultimately.

Is it true that trucks are sort of an overriding source on the highway? You hinted at that in the opening part, rather than passenger cars.

Mr. STARKMAN. That appears to be the case. If someone sets up a microphone 50 feet from a highway, the peaks in noise coincide with the passage of trucks—sometimes motorcycles. It's very seldom that the peak noises come from passenger cars, except unless you have a flock of passenger cars, and then an isolated truck.

Dr. WHITCOMB. All right. My next question may take the problem out of your domain and into someone else's——

Mr. STARKMAN. I hope so.

Dr. WHITCOMB. Is it true that, what I have heard, that as you go about 50 miles an hour with a truck, the intensity of tire noise passes, and then becomes far dominant over engine exhaust, fan, and every other noise form, so as you approach 60 or 65, which is typically the speed limit, and typically the speed at which trucks drive, tire noise is really the culprit, as you see it?

Mr. STARKMAN. It depends upon the load. If you are pulling a heavy load—well, even pulling a heavy load, what you say is true. It's more true with a light load, the tires are the predominant source of noise at highway speeds, 55, 60 miles an hour.

Dr. WHITCOMB. So then, going back to an earlier point, you said perhaps the method of measuring noise for vehicles ought to be modified.

I presume we would, what we would agree with, then, is that there ought to be some high speed measurement without pulling a hill, or anything else, just going down an open highway at speed limits of speeds.

Mr. STARKMAN. This is true. Most of our measurements prescribed by the tests that are extant today involve a low speed passby, or an acceleration from a reasonably slow speed, 30–45 miles an hour, and these are not necessarily representative of the heavily traveled throughway or freeway.

You are quite right, that is exactly what I am trying to say.

Dr. **WHITCOMB.** Incidentally, the VW might not fare as well here, would it?

Mr. **STARKMAN.** I can't even comment. I don't know.

There is not necessarily a relationship between size and noise, as evidenced by motorcycles.

Dr. **MEYER.** Just go on down the line, gentlemen.

Professor **PLAGER.** All right. Mr. Starkman, I am sorry that I haven't been able to read your paper carefully, as carefully as I would like to. Let me sort of feel my way a little bit with you.

California requires certain noise abatement equipment on vehicles and trucks sold in California—I believe it's an 88 dBA standard; is that correct?

Mr. **STARKMAN.** It just so happens there are two sets of standards. I am, incidentally, an expatriate from the State of California—I choose to call it the late great State of California since I left it.

Passenger cars in urban areas are limited to 76 decibels presently, and on freeways, 82; motorcycles, 82 in urban areas and 86 on freeways; and trucks, 88 in urban areas and 90 on freeways.

Professor **PLAGER.** Is that the only State that presently has noise standards of that type?

Mr. **STARKMAN.** As far as I am aware, California, at the moment, is the only State which is enforcing noise standards of this type. Now, there may be other standards that have to do with it's too noisy or it isn't noisy enough, reflecting back again to the subject judgments.

Professor **PLAGER.** The old nuisance standards?

Mr. **STARKMAN.** That's correct.

Professor **PLAGER.** And there are currently no Federal standards?

Mr. **STARKMAN.** As far as I know, there are some under—well, you are charged with considering standards.

Professor **PLAGER.** But there are none in effect?

Mr. **STARKMAN.** As far as I know.

Professor **PLAGER.** Does GM have any particular difficulty with meeting the California standards in terms of manufacturing, in terms of state-of-the-art equipment?

Mr. **STARKMAN.** No; we are meeting them now.

Professor **PLAGER.** You are meeting them now?

Mr. **STARKMAN.** With state-of-the-art, that is correct.

Professor **PLAGER.** So that all vehicles sold in California do meet those standards?

MR. **STARKMAN.** That's correct. The SAE J366, which is a standard specification is the standard which GM uses to make sure that their designs conform to the 92—pardon me, to the 88 dBA urban and the 90 dBA freeway.

Professor **PLAGER.** Do you use that same standard—what is it—SAE J366, do you use that same standard in building your vehicles for other States?

Mr. STARKMAN. Yes, we do. We design our vehicles to that level. That does not mean that the operator has to buy the package which is provided, as you will hear from others.

Professor PLAGER. Well, now, cars furnished in California meet those standards?

Mr. STARKMAN. That's correct.

Professor PLAGER. There is no option with the consumer?

Mr. STARKMAN. That's correct.

Professor PLAGER. Now——

Mr. STARKMAN. Our cars and our trucks, both.

Professor PLAGER. Cars and trucks as manufactured, as they leave the manufacturer for sale in California meet those standards?

Mr. STARKMAN. That's correct.

Professor PLAGER. This is—is this true in other States?

Mr. STARKMAN. Not necessarily so—and I would like to explain.

Professor PLAGER. Yes.

Mr. STARKMAN. The truck user can specify the components which he wishes placed upon his vehicle. It's different than the passenger car, and often do, and the truck manufacturer who is not constrained may choose not to buy the lower noise level vehicle, for whatever his reasons—and there are reasons.

These systems do cost in fuel economy—not very much, but enough where you are figuring pennies, and they do reduce the power—not as much as you reduce the noise, incidentally.

You are probably aware that there isn't a parallel between noise and power necessarily, but there is some small relationship. It is a pressure drop one suffers when you put the muffler and the tailpipe on a truck that didn't have one previously.

Professor PLAGER. Well, I take it, then, that GM does not, on its own initiative, provide noise abatement equipment in the same way they provide fenders. In other words, the typical automobile purchaser in Illinois has no option as to whether he gets fenders or four tires or a roof, unless, of course, he is buying a convertible, because GM imposes that on us, but GM does not take the step of building into our cars, I take it, the noise abatement equipment unless the Government imposes that on GM. Is that the posture you are in?

Mr. STARKMAN. Not wishing to get into a difference of opinion with you, it's not because GM says you must have fenders; it's because the States say you must have fenders.

I would only again refer back to a previous speaker who said that in the competitive situation of, say, heavy-duty vehicles, that it is not to be expected that one manufacturer will place an item on a vehicle at his own detriment in the competitive field, where the other manufacturers will leave that item off, and given a choice by the purchaser of a vehicle that has an emission containment system, a noise containment system which his particular State, or the State in which he operates does not require, I think that it might be illogical for GM to force that item on the purchaser.

Professor PLAGER. Would you think the same thing was true of cars as well as trucks?

Mr. STARKMAN. No; because the car buyer does not specify, in the main, except in dual exhaust—I don't try to make the impression here that dual exhausts were invented because they were quieter; they were invented because one can gain more power from the same engine with a dual exhaust system, but along with this goes a quieter car, believe it or not, for the same muffling system.

Professor PLAGER. All right. Well—all right, let me be sure I understand that. Are you saying, particularly with regard to trucks, at least, that GM would feel no ogligation, as a corporate body, to undertake equipping these trucks as a routine matter?

Mr. STARKMAN. No; to the contrary. GM tries to impress upon the truck user that he should buy this system, and offers it up as the usual thing, and it's up to the truck user.

Professor PLAGER. But it's up to the truck user, except in California, where State laws require it.

Mr. STARKMAN. He has no truck—the truck user in California has no choice.

Professor PLAGER. So if we want this equipment on our trucks in Illinois or New York or wherever, the option is State regulation, or Federal.

Mr. STARKMAN. Or Federal regulation, yes; or local regulation. There are cities that have ordinances, too.

Professor PLAGER. Now, let's talk about the cars for just a minute. Is there any reason why the GM has a fair share of the automobile market these days—I believe that is a fair statement?

Mr. STARKMAN. Yes, sir.

Professor PLAGER. Is there any reason why GM cars couldn't come automatically equipped, no options provided, with appropriate noise reduction?

Mr. STARKMAN. For an increased price, yes, sir.

Professor PLAGER. For an increased price?

Mr. STARKMAN. Yes, sir.

Professor PLAGER. Could GM do this?

Mr. STARKMAN. Not and stay competitive in the field, no, sir; not unless the other manufacturers did the same thing.

Professor PLAGER. GM wouldn't want to assume that risk, and then try to market that?

Mr. STARKMAN. Not only wouldn't want to, they couldn't and stay competitive in the field.

Professor PLAGER. All right. On the question of staying competitive, I notice you make reference to a dual exhaust option on the Chevrolet Impala——

Mr. STARKMAN. Yes, sir.

Professor PLAGER. Which is one of the noise abatement things; you indicate it as a manufacturer that one of the problems is it costs money staying competitive—you indicated as a manufacturer's suggested retail price of $30.55—this is on page 13 of your statement. Would you tell us what the actual cost to the manufacturer is of that unit?

Mr. STARKMAN. No, I can't tell you.

Professor PLAGER. You don't know, or you won't?

Mr. STARKMAN. I don't know.

Professor PLAGER. You don't know?

Mr. STARKMAN. No.

Professor PLAGER. Could you find out for us?

Mr. **STARKMAN**. I kind of doubt it. I think that if you ask any manufacturer of any product what his costs are for the product, you would have a difficult time finding out.

Professor **PLAGER**. In other words, one of the variables in why you are not staying competitive is, perhaps, because the profit margin in adding this kind of equipment runs it up too high?

Mr. **STARKMAN**. This I couldn't comment on.

Professor **PLAGER**. All right. Thank you, sir.

Mr. **HINTON**. Mr. Starkman, I am interested in your paper also. I wish I had a chance to read it fully.

Mr. **STARKMAN**. I apologize that we didn't get it to you.

Mr. **HINTON**. We didn't receive any of these ahead of time, so I was interested to note that you have employed an acoustical consultant—you, in concert with other manufacturers, in cooperation with other manufacturers, to identify the annoying elements of traffic noise, vehicle noise, and then you said:

> Once these data are available, they will offer guidance as to which elements of vehicle noise may be critical to the public, (1) when a single vehicle passes, or (2) when the environmental noise of high traffic volume is present. When this has been established, vehicle regulation may be prepared so that environmental noise can be expected to respond.

I would like to ask you, don't you think it would be desirable, in the interim, to develop the noise reduction techniques that you know you have identified—the fan source, the engine source, the exhaust source and so forth, to just go ahead systematically in your design work, seeing if you can't find lower noise design techniques?

Mr. **STARKMAN**. We routinely do this.

Mr. **HINTON**. I see.

Mr. **STARKMAN**. It's much better to have an idea of the character of noise, or any other function you are investigating, and be able to attack the problems in a rational way, I think, rather than trying every kind of a blacksmith operation you can think up. This works, and we have been very successful, and others have as well, and bending iron until finally you get something that is reasonable in its function, or optimized in its function, but it's better to know why it got there, and this is what we are after, is finding out fundamentally—we are not waiting for that, we still are doing things that may not necessarily have all of the science that we would like to have behind the development.

Mr. **HINTON**. Thank you.

Mr. **MARTIN**. Mr. Starkman, I think you mentioned here—but just to clarify—is GM—and the same question applies to the automobile industry, automotive manufacturers in general, are they for a uniform law, Federal law to cover trucks, vehicles, et cetera, instead of what is becoming a hodgepodge across the country?

Mr. **STARKMAN**. I don't know, but I think they should be. I can only speak for General Motors, and for General Motors, yes, we want uniformity. We would much rather have uniformity than diversity.

Professor **KERREBROCK**. There seems to be a noise floor for trucks at about 85 dBA according to your diagram here, which is set by the engine. I presume this is a heavy diesel engine?

Mr. **STARKMAN**. Yes.

Professor **KERREBROCK**. Yes.

Mr. **Starkman**. I am sorry, most of the heavy-duty vehicles, or ones that are up in the 50,000 to 76,000-pound gross vehicle weight level are diesel-powered, and very few that are gasoline-powered that I know of, and so this is diesel engine noise that after you have taken care of the exhaust and the fan by appropriate means, is the predominant factor.

Professor **Kerrebrock**. I presume that we have to face this problem when trucks are passing through communities and so forth, so that certainly, except on the expressway, that is a serious problem.

Now, the question is, are you looking seriously at the potential of the gas turbine for——

Mr. **Starkman**. Yes.

Professor **Kerrebrock**. Lowering this particular level?

Mr. **Starkman**. The gas turbine is—I think you have read, in the first stages of an effort to place it as an alternate powerplant to the diesel engine, and heavy-duty vehicles. General Motors is, through its Detroit diesel division, is working on this aspect of powerplants. You are probably going to ask—I will anticipate—is a gas turbine going to be quieter or more noisy than a diesel?

Professor **Kerrebrock**. Yes.

Mr. **Starkman**. It will have to be quieter when we are through with it.

Professor **Kerrebrock**. Otherwise you won't build it?

Mr. **Starkman**. I think it would be inadvisable to build it if it were not capable of being quiet, even though it might have other attributes.

Professor **Kerrebrock**. How much quieter?

Mr. **Starkman**. We don't know yet. We are still working with it.

Dr. **Meyer**. Mr. Starkman, in the absence of other legislation, can I infer from what you said about your present policy, that you consider the California law the most restrictive of the ones that you now know of, and so most of your truck packages are designed specifically against that requirement?

Mr. **Starkman**. That's correct. This is because it is really the presently—I emphasize presently, because there are other efforts underway to devise limits on noise, both from trucks and passenger cars, and other entities, political entities; but at the moment we design to the California limitation.

Dr. **Meyer**. So in effect, then, the national standard, insofar as General Motors is concerned, is the California standard?

Mr. **Starkman**. It could easily be, if it were, became a standard, we could meet it.

Dr. **Meyer**. But what happens if next week the city of New York, or the city of Honolulu—I realize you don't ship a lot of vehicles there, but let's say a place where you ship a lot—let's say in the city of New York, which is a large market, comes up with, as they are considering right now, perhaps a more restrictive one than the California?

Mr. **Starkman**. It depends on how restrictive—if, as an example, if it were 2 decibels more restrictive, we could meet this with larger, heavier, and more costly exhaust systems. If it were 4 decibels lower, we would have to start doing something about fan noises.

Dr. **MEYER**. I have a question in accordance with the rules under which we are operating; as you know, we don't allow questions direct from the floor, otherwise we would have a debate rather than a hearing, but I have a question submitted to me by an individual, which is a logical one to fit in with this line of questioning.

It is, do you feel that the automotive industry could meet the Chicago Code for heavy trucks by 1975; namely, the 84 dBA, you obviously already—it's measured at 50 feet—I think you have answered that question.

Mr. **STARKMAN**. It would take considerable investment. Perhaps, I am not sure.

Dr. **MEYER**. How about——

Mr. **STARKMAN**. And we would then get into the matter of tires, you understand.

Dr. **MEYER**. And also the question of 75 dBA by 1980, which is in this law they distributed to us this morning.

Mr. **STARKMAN**. I personally would have difficulty in visualizing what you could do to a heavy truck with the constraints of the tires.

Dr. **MEYER**. In other words, there may be a law on the books of the city of Chicago that is technologically impossible to meet?

Mr. **STARKMAN**. From our present knowledge, we could not meet the 75 dBA with a heavy truck.

Dr. **MEYER**. In other words, you are saying that there is a need for more research, then, both on the part of industry, for somebody to see if this is technologically feasible in this time frame?

Mr. **STARKMAN**. Yes, sir; that is correct, if we take a truck, as on the existing truck and run it by with its engine shutoff, which means no fan noise, no engine noise, no exhaust noise, the predominating noise is from the tires, and it's well above 75.

Dr. **MEYER**. Well, we are, of course, going to have a witness from the Rubber Manufacturing Association, who, I hope, will be able to address himself a little bit to this problem.

Mr. **STARKMAN**. Yes. I would rather that he handle that question.

Dr. **MEYER**. Yes. So the next part of the question, then, I guess is relatively moot, which would be what percent of the total cost would be involved in the meeting of the limits? At this point you would be unable to say, I guess.

Mr. **STARKMAN**. No idea.

Dr. **MEYER**. Thank you very much, sir, for a most useful presentation, and we look forward to working with you and getting more information as time goes on. Thank you, sir.

Mr. **STARKMAN**. Thank you.

Dr. **MEYER**. The next witness, from whom we hope to hear another viewpoint from the same industry, is Mr. John Damian, a representative of Mr. Starkman's competitor, the Ford Motor Co., who is present. And we welcome you, sir, and would like to hear your views on this same subject.

Mr. **DAMIAN**. Thank you.

Dr. **MEYER**. Do you have a copy of your testimony?

Mr. **DAMIAN**. No. I regret right now I do not. This is my principal one; I have been trying to cross out things as they came up.

Dr. **MEYER**. All right.

STATEMENT OF JOHN DAMIAN, FORD MOTOR CO.

Mr. DAMIAN. Mr. Chairman, my name is John Damian; I am vehicle regulations manager of the engineering and manufacturing staff of the Ford Motor Co. With me is Roger Jeble, who is systems engineer in our heavy truck engineering department.

On behalf of my company I want to express our appreciation for this opportunity to present some of our comments on the subject of noise, since Federal legislation will undoubtedly encompass vehicles produced by Ford. I would like to make a few preliminary comments regarding the regulation, particularly Federal regulation of the vehicle manufacturing processes.

Vehicle manufacturers are now subject to two extensive and comprehensive Federal regulatory activities; vehicle safety and vehicle emissions. Emissions standards are promulgated by the Environmental Protection Agency; safety standards by the Department of Transportation. The addition of Federal noise regulation would subject vehicles to a third set of standards to be developed by EPA. We support this additional form of regulation, but we are concerned that when the regulatory pattern to be established does come into being, it does not lose sight of the problems which are inherent in multiple regulation, and to make provisions for the solution of these—of those problems. One such problem is the need for consistency or compatibility of regulation.

Since most vehicles sold in this country are mass produced, and not custom built, regulations must be absolutely consistent with one another. The fine tuning required to resolve even minor conflicts between regulation is simply not available to the mass production manufacturer. For example, when confronted with emission requirements that may make noise regulation more difficult, or even impede it—which is to take precedent? If catalysts are effective for emission control but occupies space which sound deadeners might otherwise occupy, would the Administrator of EPA have the authority to set standards to recognize the conflicting demands upon vehicle design and performance, or must the vehicle manufacturer undertake the colossal task of completely redesigning all of these vehicles at once?

We would hope that the Administrator has that appropriate authority, the authority to require that noise standards be effected in a manner compatible with safety and emission control—permissive authority to set noise standards as research criteria and findings on contributed—contributory sources are required, and authority that insures that no other level of government be permitted by its actions to frustrate this deliberate pattern of regulation.

I have heard, with you members, some of the comments by Dr. Starkman, so I won't get into them, but let's get into, for example, one item, and this is the decibel. Because of the logarithmic nature of decibels, they cannot be subtracted arithmetically; a one decibel increase in the—decrease in the noise level of a single source actually results in a 10.8 percent decrease in the sound pressure level.

For example, California law presently sets a standard of 88 dBA for heavy trucks, and calls for a 2-decibel reduction, to 86 dBA for 1973, 2-dBA reduction will require a sound pressure level reduction of over 20 percent in the total vehicular noise. It must be understood that the technology of measuring total vehicular noise is in its relative infancy.

In recent years my company has tested vehicle noise in correspondence with the Society of Automotive Engineers, which are J986–A, relative to passenger cars and light trucks, and J366, so I won't go into any more detail on those. Ford has long taken steps to systematically reduce sound levels for both cars and trucks.

When I speak of sound levels, again I speak of total vehicular noise. For example, in 1964 some passenger cars were in excess of 90 dBA. Now our passenger cars have been reduced to levels not exceeding 86 dBA.

The current goal for all Ford passenger cars is to meet the California requirements of 84 dBA for January 1, 1973. Now, truck noise levels have also been significantly reduced from over 90 dBA in some cases to current levels of 88 dBA. Again we project levels of 84 dBA for January 1, 1973, which is the existing California requirement.

I would be remiss if I gave you the impression that the January 1, 1973, levels will be easy to achieve. For example, in our truck lineup we have current units that present significant noise reduction problems for us, particularly the diesel-powered units.

We are currently considering noise suppression methods for such components as the engine, the fan intake systems and exhaust systems. Perhaps the most troublesome units will have to be shielded with some kind of acoustical materials.

The solution of the problem will require action by both the engine manufacturers and ourselves. Any regulations adopted should recognize this problem of dual responsibility.

Tire noise is another factor which contributes significantly to the total vehicular noise, particularly at higher speeds, so I won't go into further comments about that. Popular belief to the contrary notwithstanding, in some cases we have found out that the vehicle noise is not limited to the exhaust system, but in some cases the vehicle—the exhaust system is not the primary source of vehicle noise. You are now getting back now to the regulatory scheme of noise control.

I would like to refer to specific aspects for your consideration. This is based on our experience as manufacturers and distributors of automotive products in which considerations which we believe necessary to achieve maximum effectiveness with a minimum cost to the public.

Since motor vehicles and other products that are likely to be the subject of noise regulations are largely mass produced and nationally marketed, it is important that the standards applied to such products be uniform. For this reason we hope that EPA will have such authority, sufficient authority to achieve a consistent pattern of regulation, and that there be a satisfactory preemption of other governmental bodies. If manufacturers are subjected to differing standards, mass production becomes unduly difficult and costly, if not impossible.

When I speak of the need for uniform standards, I include therein not only decibel units within limits, but also the precise test and test procedures by which the actual numbers are checked and verified. If States are allowed to establish and force the same decibel levels as required by Federal regulations, but are free to establish different enforcement procedures or test methods, there is no uniformity, in fact.

Furthermore, the standards should precisely define its area of productivity, so without concern the Administrator, the manufacturer, and the States are aware of the scope of the standard. For example, it does little good to have a uniform Federal standard for a total vehicle noise if it is possible to have inconsistent standards for the performance of mufflers or fans or tires, or any of the other components that are incorporated in the new vehicle.

The new vehicular controls are not the only answer. In order to insure that vehicles are maintained and operated within acceptable noise limits, the States must take positive and comprehensive steps in enforcing compatible noise controls in the operation and use of the vehicle. We think that the adoption of compatible State standards and enforcement programs is a very necessary part of any realistic effort to control noise in our environment.

For the reasons discussed earlier, we think that the Administrator should exercise maximum flexibility in achieving noise control objectives with a judicial and legal protection limit, he should have authority to decide whose noise properties make standards necessary, what those standards should be, and the time frame in which they should be applied.

We also endorse the establishment of criteria, the level at which damage to human beings occurs, and the education of contributing sources of noise, and the level of that contribution as a necessary and practical preliminary to the establishment of noise standards. We believe that the noise standards should be imposed where there is a demonstrated need for noise control, and suggest that noise abatement standards must be compatible with regulations governing environmental and safety features of various products in order to assure that the standards can be met in an expeditious, orderly, and efficient manner. They must pass the test of technical feasibility.

In addition, the Administrator should consider the cost of compliance in determining the substance and effective dates of the standards. While costs need not be the paramount concern, surely it should play a part in setting reasonable and practicable standards.

We also suggest that the Administrator conduct cost benefit studies as part of his procedures in promulgating regulation, and that the results of those studies be published as part of the rulemaking process. Such studies should include statistical data supporting the needs for the standards. Further, standards should be issued in terms of performance levels that are to be achieved. This permits our scientists and engineers to seek, on a continuing basis, new and better ways of meeting the standards with resultant benefits to both our environment and to the public. I should also note that the measurement techniques are almost as important as the standards themselves.

With compliance with standards—if compliance with standards can be determined only through the elaborate, complicated laboratory procedures, they would not be practicable, since consistent control, both in production and enforcement, would be virtually impossible. Moreover, repair would likely be difficult, since dealerships and repair shops would be unable to purchase or operate such equipment at their places of business. The promulgation of standards should, for these reasons, be contingent on the availability of simple, reliable and easily used test procedures and equipment.

I hope that my remarks today have given the members of the committee some feel for the complexity of vehicle regulation in general, and noise regulation in particular. The technology of noise control is, in the field is in its relatively, relative infancy. Measurement techniques is only in the early stages of development, and standard setting and enforcements will be substantially inaccurate, inexact until that technology improves.

Let me assure you that the Ford Motor Co. will continue to cooperate fully with EPA and its representatives; in this light we were pleased just recently to spend 2 days with Wyle Laboratory representatives discussing a wide range of technical subjects and the matter of noise, and I think with that, I will end my statement to you, gentlemen, so I won't take up too much time.

Dr. **MEYER**. Thank you very much. I especially appreciate the comments that you made calling to our attention your views regarding not only the need for uniformity of standards, but what needs to go into the standards and regulations, because this really is a matter of deep concern to the agency. It's one in which such forthright statements as yours is important to us, and it's important that we have this sort of thinking, so we can work toward coming up with meaningful approaches to this. Panel?

Professor **KERREBROCK**. What fraction of heavy vehicles are replaced every year?

Mr. **DAMIAN**. I am afraid I couldn't answer that. Roger, do you know?

Mr. **JEBLE**. No, I couldn't answer that, either.

Mr. **HINTON**. I would just like to have a copy of your statement, Mr. Damian.

Mr. **DAMIAN**. When I get back and put it in editorial form—I have been crossing out, in an effort to save some time for you, I will do it.

Professor **PLAGER**. Is it Damian?

Mr. **DAMIAN**. Yes, not related to Pythias.

Professor **PLAGER**. I thought your statement was a very good one. I liked the tone of it very much. It's a tone of positive cooperation and recognition of a problem we all share. Let me be sure I have got a couple of things straight; it's sort of hard to catch everything orally like that. I understood—I take it that your company meets the California standards with regard to vehicles that are now being sold in California?

Mr. **DAMIAN**. Yes, sir.

Professor **PLAGER**. That is a self-evident question, isn't it? Did I understand you to say that it was your goal to meet those standards for all your vehicles by January 1, 1973?

Mr. **DAMIAN**. Yes, sir.

Professor **PLAGER**. Now, what does that mean? Does that mean you will provide an optional package, or does that mean all your vehicles will have those qualities as manufactured?

Mr. **DAMIAN**. Let me perhaps go into a little detail on that. Our passenger cars, having better ideas, are going to be the same, and are the same.

Professor **PLAGER**. What do you mean "the same?"

Mr. **DAMIAN**. In other words, the exhaust system that we provide for California we provide for the rest of the country today, our passenger cars.

Professor **PLAGER**. As a matter of basic construction?

Mr. **DAMIAN**. That's right, sir.

Professor **PLAGER**. It's not something the purchaser has to specify?

Mr. **DAMIAN**. No, it's not, that's right. He has no choice. He takes the quiet package.

Professor **PLAGER**. How interesting.

Mr. **DAMIAN**. Now, in the heavy truck line, our standard exhaust systems are the California systems. In other words, if you buy a truck in California you will get an exhaust that is just like the truck that you buy in Illinois, or some other place, our heavy trucks.

We do have a small group of very light vehicles that do not have the California muffler all over the country. They are options, and we provide those in the various areas; we provide them to the owner if he wants them, period, and secondly, if he, obviously if the areas that have noise control regulations, they are provided in those areas mandatorily. This would be Chicago; this would be Colorado; this would be areas of that sort. There are about nine laws on the books now.

Professor **PLAGER**. Now, what was the meaning of the January, 1973, date?

Mr. **DAMIAN**. Oh, in the current California law there is a regulation that applies to vehicles built after January 1, 1971, and to vehicles built after January 1, 1973. That is the current California law. This is the current law, for example, in some other areas that have adopted regulation, or adopted laws similar to California, so we are working our—I was going to say something, but we are working toward the establishment of a structure that will meet the January 1 deadline.

Professor **PLAGER**. For all your vehicles?

Mr. **DAMIAN**. Yes, sir. Now, we—yes, go ahead.

Professor **PLAGER**. Are you going bankrupt or are you staying competitive?

Mr. **DAMIAN**. Well, that is another area that I wish I could respond to.

Professor **PLAGER**. It's sort of a rhetorical question.

Mr. **DAMIAN**. Yes.

Professor **PLAGER**. I take it you are able to stay competitive and do this?

Mr. **DAMIAN**. Well, we are No. two now, whatever that gives you.

Professor **PLAGER**. Was—what is your comment on Mr. Starkman's statement that GM could not meet the California standards as a matter of basic equipment and stay competitive, presumably with Ford?

Mr. **DAMIAN**. Well, I don't know, because Mr. Starkman I guess is in the same boat that I am. We don't make the decisions about that sort of thing. We simply work in the technical end and try to do it. I don't know that GM's policies are that far from policies that I would even like to comment on—I wouldn't know how to comment on them.

Professor **PLAGER**. Would it be fair to say this is apparently a management decision rather than an economic decision?

Mr. **DAMIAN**. I couldn't even put myself in that——

Professor **PLAGER**. I wouldn't ask you to comment on that.

Mr. **DAMIAN**. Thank you.

Professor **PLAGER**. Thank you, sir.

Dr. **WHITCOMB**. One very brief question; what constitutes a heavy truck? What is the limit? We have heard 50,000 to 80,000—is 80,000 the number limit?

Mr. **JEBLE**. No, 6,000 pounds and above, heavy truck by noise standards and emission control.

Dr. **WHITCOMB**. Up to what?

Mr. **JEBLE**. Oh, it can go almost to 100,000 pounds with combinations of trailers.

Dr. **WHITCOMB**. Is there a highway limit?

Mr. **DAMIAN**. Yes, there is an interstate limit.

Dr. **WHITCOMB**. Is there much of a correlation between weight and noise?

Mr. **DAMIAN**. Yes, there would be, as Mr. Starkman mentioned before.

Dr. **WHITCOMB**. Is it reasonable that one way of controlling it would be either weight limiting or another consideration, tire noise might be speed limiting, to get down to the extreme peaks of freeway noise?

Mr. **DAMIAN**. Perhaps that is a point that might be considered. In other words, States could possibly consider the operational mode of vehicles.

I think Mr. Starkman pointed up very eloquently in terms of speed—in other words, the higher you go, you introduce additional noises. Tires, I imagine, would be one.

Dr. **MEYER**. Thank you very much, sir. We are pleased that you are here. Again, as I said, I offer our apologies, but I am glad you are all so understanding and willing to carry this important proceeding forward. We will call now on the representatives from the Chrysler Corp., and we apologize to you, too, sir, for the delay.

STATEMENT OF TED SHREVES, CHRYSLER CORP.

Mr. **SHREVES**. I might add, my name is Ted Shreves. I am with the Government regulations—Government relations staff, Chrysler Corp. in Detroit. I have with me today Mr. Bill Scott, who is manager, sound and vibration department in our corporate engineering department.

We presumed, being third here, that anything we might say would be sort of redundant. We would be repeating what GM and Ford had said, and having briefly read Mr. Starkman's statement, of GM, and Mr. Damian of Ford, they did pretty much cover the same ground.

I wanted to make one observation, and then what we thought we could do, if you have any questions, we would try our best to get the answers for you.

Our one big concern at this point is that we don't sacrifice safety and air pollution for noise. This could be very easy to do in the air pollution area something to do; in the air pollution area, of course, one of the critical items is the exhaust system, as it is with noise.

In safety, when you are talking tires, you could probably reduce the noise emission from tires, but at the same time you could probably be reducing the braking ability of the car, the traction of the wheels to hold the road, the control and so on, so I am only suggesting and hopeful that you will consider it very carefully in setting noise standards.

Dr. **Meyer**. Well, I think that I should respond to that before asking the panel if they have some questions, and I can imagine at least one or two of these questions in advance. One of the reasons the Environmental Protection Agency was created, of course, was to pull together some elements of the Federal Government that were scattered around dealing with the different concerns and considerations of the environment. So you can rest assured as an element of the Agency, the problem of interrelationship and systems approach to environmental concerns will be given attention.

We have, as a matter of fact, been working with those concerned in the Office of Air Pollution Control on the question of joint monitoring systems as an example, or integrated noise and gaseous contaminant monitoring at certain locations. So I want to assure you that within the Environmental Protection Agency this sort of recognition already exists, and will continue to exist, and that we also are deeply concerned with all aspects of responsibilities of our sister agencies in the Government. I am glad you brought this up.

Mr. **Shreves**. It's encouraging to hear that.

Professor **Plager**. Mr. Shreves, some of us who, I suppose are the consumers of the world, are doing our part to keep the economy going, and would rather not have to turn all the time to government, Federal, State, or otherwise in order to be able to consume products that do not degrade our environment. We look to corporations for leadership and responsibility.

We just heard from two; one corporation, Ford, apparently has made a management decision to try to do something about noise problems without having to be beaten over the head nationwide. The other corporation, General Motors, seems to maintain its historical position—which we are all familiar with—in the safety area. I was wondering if you would care to comment on what Chrysler's management position is with regard to this item.

Mr. **Shreves**. Well, I don't know that we have a stated position at this point on noise, or the very definite commitment on noise. I do know that recently—maybe you are aware of this—we have established—and your vice chairman of the board, an office of public responsibility which covers this entire area; this is a level interest, possibly, that we didn't have 10 or 15 years ago, and I think it shows that with a very—that we are very definitely committed in all areas of responsible social responsibilities, environment, jobs, training, problems in the city and the whole thing, I would think.

Professor **Plager**. Are you——

Mr. **Shreves**. We are doing approximately the same as the other companies, for example, yes.

Professor **Plager**. How about for the country?

Mr. **Shreves**. I believe ours are the same. I believe our passenger cars are the same nationwide.

Mr. **Scott**. Our 1972 production passenger cars will all be the same.

Professor **Plager**. In other words, the California standards will be in effect; you will be producing the same noise abatement package uniformly?

Mr. **Shreves**. That's right.

Mr. **Scott**. That's right.

Professor **Plager**. What about the 1973 California standard?

Mr. **Scott**. Yes, we will continue to build cars only one way.

Professor **Plager**. Only one way?

Mr. **Scott**. Yes.

Professor **Plager**. How about trucks? I commend you for that, but how about trucks?

Mr. **Scott**. Trucks, you know, and I think this has been attempted to be said several times today, are sold not always as a complete vehicle, but as, really, a component of another vehicle so that our customer who orders from us a set of components, which he then makes into a total vehicle. Now, in various stages—and we deliver some vehicles without even a cab on them, they can be made into a motor home, perhaps, so that the customer determines what they buy. Yes, with every one of our powerplants we offer an exhaust system to meet the California requirements.

Professor **Plager**. Thank you.

Dr. **Meyer**. Again I have to emphasize this, because it's important to the Federal Government's role, I will ask you the same question, even though I already know the answer: You are going to make all your production for passenger cars meeting the California standard, but suppose between now and the time that you are scheduled to do that—and some of us here know a little bit about the production lines, and the fact that they have to be scheduled, and tools and dies have got to be not only bought, but delivered—between now and then that a large consumer area to which you provide large numbers of vehicles, sets a more stringent standard and it becomes effective at the same time, and says they will only give you a year to perform. Will you then manufacture all of the vehicles in the United States to that standard? Or will you devote a particular production line in a plant near that, since we know you have other assembly plants to assemble them specifically for that area rather than try to meet the requirement across the nation on a most restrictive city or State code?

Mr. **Scott**. We ought to not make a hypothetical decision today which we cannot make for you.

Mr. **Shreves**. Also it depends on what the item was. It's possible something could be made and put on by a dealer in Chicago or somewhere else. These would probably be made available in the market; if it's an engine design, or new engine, new body style or something like this, we couldn't possibly do it.

Dr. **Meyer**. From a technological viewpoint, assuming the noise is from a system of tires, transmission, chassis, body, if you will, even windows, gear trains, exhausts, it's a unit that is assembled, and once it's assembled it now becomes a composite source of noise, you would have to have, in effect, either a vehicle built for the system, a transportation system built to the most restricted one, or a number of vehicles built to meet a variety of systems for specific market areas, wouldn't you?

Mr. **SHREVES**. I would, if I understand you correctly, I believe that is a fair statement, and at times we have had to produce cars that are a little different in one area than in another.

Dr. **MEYER**. So you have had some experience in the industry of doing that?

Mr. **SHREVES**. We have had—we prefer to make them all the same, obviously.

Dr. **MEYER**. Thank you very much. Anybody else on the panel have a question?

Professor **KERREBROCK**. You mentioned the possibility of a couple of technical conflicts; one is the conflict between air pollution or emission control and noise control, and I would like a clarification of what—of that, if you could, if the conflict is only with regard to total cost of the system, then maybe no explanation is necessary.

Mr. **SHREVES**. Well, we, as of this moment, we don't know how we are going to meet the Federal emission control standards as set out by the 1970 Clean Air Act. We have talked in terms of catalytic mufflers, and afterburners, and things like this. When we got done, in order to meet that Federal standard in 1975, I am just saying it could be a possibility that the noise, and for the present day vehicles could go up—maybe it could go down—we don't technically know now.

Professor **KERREBROCK**. But you plead for a sane choice if there is a conflict, and another question I would like to ask is——

Mr. **SHREVES**. Then I think we have to weigh the priorities, whether it's a noise problem is more important or the air pollution problem is more important.

Professor **KERREBROCK**. Specifically what you are asking for, I think, is that the Government make a reasonable choice between these conflicting alternatives, or conflicting requirements, if a choice has to be made; the question is, is Chrysler Corp. prepared to make its knowledge in both of these areas public?

And I would ask the same question with regard to tire noise. You see, you plead for not choosing quiet tires if they are slippery. Do you have the information on which such a choice could be made? And is it in the public domain?

Mr. **SHREVES**. I don't think we have a great deal of data on that particular point, no. I think I am getting really into your area of friction, and the tread that grips the tires. Now, they could possibly be made, say, narrower, with less tread on them, this type of thing, so you wouldn't get as much contact with the road surface. This would not be desirable.

Professor **KERREBROCK**. I am aware that the Department of Transportation has an interest in this, and may be doing some work with you. Is there information within the auto manufacturers or the truck manufacturers which should be available to the Government when it attempts to set these standards?

Mr. **SHREVES**. I don't believe so.

Mr. **SCOTT**. There is very little information from the automobile manufacturers about the design characteristic of tires. We are a user of a supplier.

Professor **KERREBROCK**. So that these comments about noise versus antiskid properties are more or less subjective rather than quantitative?

Mr. **SCOTT**. I think they may be more than that. We obviously have a dialog with our suppliers. We are obviously concerned about the constraints that will keep us from meeting various levels, and tires have to be one of those constraints, particularly in a truck. They are obviously not a maximum noise constraint in an automobile, but in a truck they are, as has been mentioned here today, so we are in dialog, and we do know that the minute we request the quieter tire we run into the traction and the braking, so that that is it.

Professor **KERREBROCK**. Do you mean by that that they provide you with numbers on the traction of the tires as a function of the noise?

Mr. **SCOTT**. We are very interested—you know, we don't get a tire that comes labeled but we are very interested in a traction capability of a tire because it affects braking, very directly, and to meet the brake standard you have to have a tire that will give you added traction.

Professor **KERREBROCK**. So then—I am still trying to get the answer to the question, which is whether you have numbers which, with which you can make a trade-off between noise and traction.

Mr. **SCOTT**. We don't have numbers available now, but I think the National Bureau of Standards, through their testing, is putting together the data that would make it possible to put numbers on at least classes of tires, and then there are data that would be able to put traction numbers on classes of tires. Yes, it could be put together.

Dr. **MEYER**. Thank you very much. I hope Mr. Kigin, from the Rubber Manufacturers Association, when he becomes the anchorman and puts the show on the road, so to speak, will have some comments on this. Thank you very much, gentlemen. I appreciate your approach here. I would like now to ask Mr. D. W. Renzel—or rather I would like to ask Mr. Richard G. Kolb, representing him, to talk about a subject that the other manufacturers have alluded to but that not very many people are aware of. And that is the fact that the heavy truck is a unique animal, or unique piece of equipment, and does present some problems with regard to the setting of standards, and I think it's most important that the panel, as our advisors, has a better understanding of this problem. Thank you very much, also, for your patience and for preparing this fine statement.

Mr. **KOLB**. Thank you, Dr. Meyer.

STATEMENT OF RICHARD G. KOLB, HEAVY DUTY TRUCK MANUFACTURERS ASSOCIATION

Mr. **KOLB**. Ladies and gentlemen, my name is Richard Kolb. I am director of engineering and technical services, Heavy Duty Truck Manufacturers Association, Washington, D.C. The organization which I represent is a nonprofit association of heavy duty motor truck manufacturers and manufacturers of associated equipment.

During the past 6 years, with Federal and State governments as well as industry, much of my professional time has been devoted to the numerous engineering, technical and socioeconomic problems associated with effective pollution abatement, and noise control. My Master's thesis was based on noise reduction from internal combustion engines, and I'm presently on the Western Highway Institute's Subcommittee on Vehicle Noise.

On behalf of the association and its membership, I appreciate the opportunity to appear here today and present our views, comments, and suggestions. Let me state unequivocally that we are concerned with environmental systems management and the protection of the people, as well as the surroundings. We are in agreement with and support environmental protection, as well as management and control of automotive noise for the benefit of the public.

We agree that noise pollution is severe and something must be done. But, limits should be legislated which are based on documented evidence.

In the area of vehicle noise, more specifically from diesel powered vehicles, there are three speed zones which have to be considered: idle, below 35 m.p.h. and above 35 m.p.h.

At idle, the major noise sources are combustion noise and mechanical noise. Below 35 m.p.h., the sources are: Exhaust, mechanical, fan, air intake, body and cargo noise. Above 35 m.p.h., tire noise is added to the aforementioned list.

Recently, we have seen published reports which indicate that 86 dBA is possible with "at most, a change in muffler." From my own experience, and recently published Society of Automotive Engineers' reports, the muffler is only one part of a complex acoustic system. It is unrealistic to predict, let alone expect, the performance of the entire exhaust system to be based solely on the muffler response characteristics. The entire system must be included, which means the manifold, exhaust pipe, muffler, tail pipe and turbocharger. Similarly, the complete analysis of the air intake system involves more than the air cleaner.

As another example, the following article was published in the October 1969 issue of Automobile Engineer.

Cheswick and Wright Ltd. in England reduced the noise level of a passenger car, with no reduction in power, by reducing the muffler volume by 50 percent. Although this does contradict established theory, it does show that quantified tests, not results based on theory, is the only way to determine practical limits.

To further illustrate the problem, the Western Highway Institute report entitled Fundamentals of Noise and Vehicle Exterior Noise Levels, reports the following:

> The relative noise levels from four major noise components from one type of diesel engine were recorded as:

	Decibel
Exhaust	86
Mechanical	82.5
Fan	82
Air intake	79

> The total overall noise measured by a sound level meter was 89.5 dB. The total noise level analytically computed from all the components was 89.3 dB, which shows excellent correlation (89.5 versus 89.3) between actual measurement and analytical methods.

They then analytically eliminated the exhaust and mechanical noise (albeit, an impossible solution in real life). The total noise level would then be only 83.8 dB. A reduction of only 5.5 dB by eliminating completely; exhaust 86 dB and mechanical 82.5 dB, noises? This should clearly point out the problem involved in attempting to reach lower overall vehicle noise levels.

Our membership continues to expend large amounts of money for research, development and testing to reduce noise from internal combustion engines. The examples I've presented indicate the problems the manufacturers face. However, let me assure you they are diligently working toward and will continue to reduce overall vehicle noise. But, the road ahead is a slow one, the largest noise reduction possible is already in effect. New research and techniques will reduce noise, but at a much smaller rate. Some of the proposed noise levels cannot be expected to be reached with current technology.

Currently, the National Highway Traffic Safety Administration has Docket 69-2 pending, which will increase the horsepower of heavy duty trucks for highway safety. If approved, this docket will effect an increase in the vehicle noise level. On the other hand, the Environmental Protection Agency is anticipating reducing further, the pollutants from diesel powered vehicles. Information from manufacturers indicate that larger displacement engines, with the same horsepower rating as today's engines is the most likely answer to meet future EPA emission standards. In effect, this would assist in holding down noise pollution. However, if the standards from both agencies must be met, then we can expect larger engines and higher noise levels.

It is also quite possible that the National Highway Traffic Administration's Motor Vehicle Safety Standard 121 will affect highway noise. This standard sets a stopping distance which all vehicles must meet. However, stopping distance is a function of highway surface texture, tire tread pattern and brake lining friction coefficient. We may have, in the future, higher noise levels from vehicles just due to a change in some of the aforementioned factors. We have also heard that passenger cars and heavy duty trucks should both have the same noise level. Unfortunately, engine noise is a function of power and displacement. No one expects that the same power is necessary to haul 60,000 pounds as 6,000 pounds, at equal speeds. On the other hand, one way to reduce noise is to have the trucks reduce their speed, however, this will increase the irritability of the passenger car driver, traffic jams and dramatically affect our economy. Realistically, we should not expect equal noise levels from passenger cars and trucks.

In the area of Federal legislation, it is our conviction that one law, nationwide, will be in the best interest of all concerned. With the advent of the interstate system, our economy can ill afford to have 50 or more different State or city laws and ordinances on noise control. It would appear that Federal legislation in this field should preempt all proposed and presently enacted noise legislation, whether it be city, county or State level. Further, we would endorse, that EPA also set noise standards, again preemptive, on equipment already in use and that a reasonable time limit be set before older equipment has to be replaced. The best estimate on the current life span of heavy duty trucks is about 10-15 years.

Gentlemen, our country is called the United States, 50 individual States united together to form one. Let us have one law, which is uniform, nationwide and federally sponsored whenever it concerns the safety, health and welfare of the people.

Thank you for your attention.

Summary

Vehicle noise emanates from combustion, intake, mechanical, fan, tires, body, cargo and exhaust sources. Indications are, that future reductions will probably be at a lower rate than in the past, and some of the problems associated with further reductions have been presented.

Some of the questions that must be answered are: What reduction is practical with today's technology? How will future safety regulations affect noise? How will further reductions affect our economy?

We also see a need for one Federal regulation, nationwide, not only on new vehicles, but also on older vehicles.

There are some attachments to my testimony.

Dr. **MEYER**. Thank you very much for an excellent discourse on this problem, and also for at least alerting my office to another Federal agency's pending consideration on the matter of interest and concern of our collective responsibilities, which certainly we will want to talk with them about. The attachments will be included with the record.*

Before asking the panel, I note that you make the statement that some of the proposed noise levels and some of the legislation apparently cannot be expected to be reached, and this has seemingly been the expression of several other witnesses. What is the principal problem, in the lack of technology or is it a complex——

Mr. **KOLB**. It's a rather complex problem. It's not a simple problem. It, as some of the other people before me testified, if you quiet one area, then another area crops up. If you quiet that one, another one comes in; you almost don't see the end of the line.

Dr. **MEYER**. Panel.

Dr. **WHITCOMB**. Do you see any relief in going all the way to a completely new design in the next 10 years which might incorporate something like a jet engine for trucks?

Mr. **KOLB**. I really am not in a position to say anything on that. I would say it would depend—what are the people willing to pay for?

Dr. **WHITCOMB**. And then a second point, somewhere along the line in your presentation you mentioned the English study.

Mr. **KOLB**. Yes.

Dr. **WHITCOMB**. That was where a muffler was reduced by 50 percent in volume, and without reducing power, did reduce the noise level, contradicting established theory.

Mr. **KOLB**. That's right.

Dr. **WHITCOMB**. You mean established theory for mufflers is the bigger the volume the less the noise?

Mr. **KOLB**. That is correct.

Dr. **WHITCOMB**. Without resonating or any other effect?

Mr. **KOLB**. Even taking the resonating frequencies into account, this is what the theory says; you go to a bigger volume, you should reduce the noise.

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* This material is on file at the Office of Noise Abatement and Control.

Dr. **Meyer**. Thank you very much, sir.

Next I would like to ask Mr. Roger Ringham, International Harvester Co., who appeared before our panel in Atlanta and has given most useful information about one of his organization's interest, to come forward.

Mr. **Ringham**. This is Mr. Richard L. Staadt, who is our chief product development engineer in our truck division.

STATEMENT OF ROGER F. RINGHAM, INTERNATIONAL HARVESTER

Mr. **Ringham**. As I mentioned in Atlanta, we are a multidivision company, with our divisions somewhat autonomous, and particularly in the line of trucks we are probably the closest to it of any of our operations. Dick is a good spokesman for that subject. We have prepared our presentation, and Dick will present it.

Dr. **Meyer**. You may proceed.

Mr. **Ringham**. Thank you. International Harvester Co. manufactures and sells on and off highway transportation equipment; that is, a full line of utility passenger vehicles and motor trucks ranging from a small four-wheel drive vehicle to large over-the-road semitrailer diesel tractors and on-off highway oil field and constructor trucks. Our truck division operations produce an almost limitless variety of vehicles in that many options of engines, drivelines, cabs, suspensions, frames, et cetera, are offered.

Today we would like to review typical truck noise, its sources and measures involved in controlling truck noise. Finally, we would like to comment on the overall approach to legislative control of highway vehicle noise. Most comments will be directed toward large diesel-powered units which compared to lighter vehicles produce more noise and are of most concern to the public.

We should point out that the small passenger-utility vehicles are presently limited to 86 dBA at 50 feet and the larger units are 88 dBA maximum to conform with existing regulations of some States and cities.

We would like to review a cross section of our product line.

Dick.

Mr. **Staadt**. By the way, as brought out earlier, the California law does have provisions for a tightening of this requirement in 1973. The present is 88 on heavy vehicles and 86 on light, and in 1973, starting January 1, 1973, this has dropped 2 dBA in each case, makes the heavy vehicles 86, and the light 84.

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This is our smallest vehicle—the Scout. It is available as a two- or four-wheel drive vehicle; however, generally is sold as a four-wheel drive for recreational and utility use, on and off the highway. Engines offered include four-cylinder, six-cylinder and V–8. The Scout is built at our Fort Wayne, Ind., plant.

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This is the Travelall which is a heavy duty station wagon used for recreation such as trailer towing, family transportation, or for business use in the panel version. Six-cylinder and a full line of V–8 engines are available.

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The IH pickup line—available in a full range of sizes, two- and four-wheel drive, six- and eight-cylinder engines. The Travelall pickup line are manufactured at our Springfield, Ohio, facility.

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This is the Loadstar line for general light commercial uses, either as a semitrailer tractor or straight truck shown here. V-8 gasoline and light-duty diesels are available in this line built at our Springfield, Ohio, factory.

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The Cargostar is a cab over engine version of the Loadstar. It features unusual maneuverability for in-town delivery operations.

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The Fleetstar is a medium duty line with in-line diesel (as opposed to V-configuration) engines. Principally an over-the-road tractor manufactured at Fort Wayne, Ind.

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The CO Transtar line is a cab-over-engine long-haul tractor. This model is built at Fort Wayne, Ind., and San Leandro, Calif. It accommodates seven basic diesel engines, three cab lengths, and approximately 14 exhaust system arrangements. Each of the many combinations of these components requires a separate noise control development. This variety is typical of all heavy duty model lines.

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The conventional Transtar is the long-hood version of this series. This vehicle is used as on or off highway vehicle, featured with a wide line of diesel engines. Again, this model is manufactured both at Fort Wayne and San Leandro.

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The 210–230 series is an extra heavy on-off highway vehicle. In addition to the mixer configuration shown here, it is also very popular in oil field special applications.

Let us now get to sound levels.

Highway sound levels are measured per SAE recommended practice J–366. This procedure involves maximum noise under 35 m.p.h. as would be experienced by an observer 50 feet from the road. To produce maximum noise the vehicle is at full acceleration at maximum engine speed.

Sound levels on our small vehicle, namely the Scout, Travelall, or Pickup are a maximum of 86 dBA at full engine speed and acceleration under 35 m.p.h. Under these severe conditions, the engine exhaust and possibly cooling fan are the predominant sound sources. Under normal part throttle cruise conditions, the noise levels are quite low and characterized by tire and wind noise. Only in the case of poor maintenance or alteration of the exhaust system is noise from small vehicles a problem with an 86 dBA requirement (J–366).

The criteria for regulations must reflect test conditions and procedures specified for verification of compliance. For example, when considering regulation levels for manufacturers, care should be taken not to base full throttle, full engine speed requirements on observed part throttle cruiseby levels.

Vehicles which contribute the most to highway noise are the large diesel powered trucks. Several noise sources are inherent in these units:

1. Exhaust noise—Here we mean noise at the muffler or exhaust pipe outlet.

2. Cooling fan—The fan moves large quantities of air through the radiator against quite high restriction.

3. Engine air intake—The engine air intake emits noise due to the pulsating air movement.

4. Engine mechanical and combustion—The sharp pressure rise in the diesel combustion chamber results in noise being radiated from the engine surfaces.

5. Tire and wind noise—This includes tire rolling and wind noise plus other small noise sources.

The total sound emitted by a representative diesel truck in compliance with existing regulations would be 88 dBA. This total noise is produced by the above sources as shown in slide 10. Note that several of the individual five (5) sources approach the total vehicle level.

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Let's take a look at what happens if we completely eliminate certain sound sources.

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For example, if we eliminate the 84 dBA exhaust noise by a theoretically perfect muffler, the total noise level would only drop to 86 dBA. This illustrates the fact that larger and better mufflers alone are not the solution to heavy vehicle noise.

Similarly, if other single sources are eliminated, only a slight drop in overall noise is realized. Since exhaust noise cannot be eliminated completely, the only approach which can reduce overall levels is to lower all sources which individually approach the level of the total. Such an approach was taken in the case of the 88 dBA vehicle in the foregoing example.

The measures employed were:

1. The cooling fan was run at a slower speed to reduce fan noise and radiator size increased to offset the loss in cooling air flow.
2. A larger, more efficient muffler reduced exhaust noise.
3. The air intake noise was reduced by an improved silencer relocated from the side of the hood to the front to direct sound away from observers.
4. Shields around the engine compartment now block engine radiated mechanical and combustion noise.

The resulting overall noise level is now 86 dBA. It should be noted that most of these modifications required considerable redesign thereby making retrofitting extremely expensive if not impossible.

We need to emphasize that not all vehicles respond to these measures. Other models and engine combinations require redesign of this degree just to meet the present requirement of 88 dBA established by some States and communities.

We consider 86 dBA to be the next plateau in heavy truck noise control. Major cooling fan development programs and further engine shielding will be required to meet this level. To get below 86 dBA will involve extensive programs in engine and cooling system redesign and development. This will involve several years in time and is likely to reflect considerable increase in cost to the user.

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One additional factor at higher road speeds is tire noise. The familiar high pitched whine in some cases overshadows the sources discussed earlier. This noise is caused by certain tire tread designs of the type shown in Slide 12, which either aerodynamically or mechanically react with the road surface to produce noise. This sound carries long distances, particularly as the vehicle moves away from the observer.

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The relationship of high-speed tire noise to other vehicle-produced noise is shown in slide 13. Note that at low speeds tire noise is not a factor with any tread design. But as speed increases, the noisy tire contribution can become quite predominant, overshadowing other sources.

We feel the best way to regulate and minimize tire noise is through control of tire tread designs allowed on the market. In this way, offending tires could not be inadvertently installed as replacements and would be phased out of highway use in a relatively short time.

The relationship of maximum noise to normal operation noise is different for small vehicles than for large vehicles. The power to weight ratio for a passenger type vehicle is high enough that normal operation is at light throttle. This lighter engine load causes less sound than full throttle at maximum engine speed (J–366) trucks. Their power is low compared to their weight. The operator must operate the engine at maximum power, speed, and noise level much of the time.

Regulations or sound limits for the vehicle user should not be lower than those required of the manufacturer or user at the time the vehicle was built. The operator, or manufacturer, for that matter, has no means of making the vehicle quieter than it was when originally built. As shown earlier, significant sound reductions by retrofit programs generally are not practical.

Regulations cannot be effective without proper enforcement. Our experience in sound measurement has shown that there is as much art and subjective judgment as science in this activity; thus, we feel enforcement personnel must be trained in noise surveillance and operate at the carefully selected sites which are required for accurate readings.

As we previously indicated, our products are sold nationwide, and in fact, worldwide. It may be a long time before there are international standards for noise control. But we do hope that within the United States the Federal regulations will preempt all State and local controls. We further urge that these requirements be developed and announced well in advance of their effective date. This will permit the economies that result from orderly product development and implementation which, depending on degree of change, can require up to several years. We appreciate the opportunity to make this presentation before your group and hope it is helpful to you.*

Dr. MEYER. Thank you very much, sir. It has indeed been helpful. This provides information that we will not only find useful in the report to Congress, but also in whatever standard setting activity we undertake, given some authority by the Congress. Panel?

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* The slides for this presentation are on file at the Office of Noise Abatement and Control.

Dr. **Whitcomb.** Is your company doing any R. & D. activity on truck engines, other than strict diesel engines as far as quiet engines?

Mr. **Ringham.** Our efforts are primarily devoted to the diesel engine because it is the bigger problem; the quieting of the gasoline engine, yes, we are working on that. However, it's primarily, Dick, a matter of mostly exhaust intake treatment, isn't it?

Dr. **Meyer.** I believe the question, as I understand it, is are you exploring some alternatives to the diesel?

Mr. **Ringham.** I am sorry, we have—we ran an experimental program with our solar division on a strict experimental turbine several years ago. We learned enough to know it was a big development—it was bigger than we were, but it alerted us to the fact that that is a potential, and, Dick, if I am recalling correctly, that particular experimental installation, it was only partially treated noisewise. The passby noise there was in the low eighties?

Mr. **Staadt.** Yes. That is correct.

Mr. **Ringham.** In terms of dBA noise level, I can't recall the exact number, but that is the kind of thing that might be attainable at a price. This, incidentally, was a turbine configuration. It wasn't exactly fuel economy oriented, but it was one that drove a truck.

Professor **Plager.** You indicate that you have a variety of noise control developments depending upon the package, the vehicle package that is put together. I take it when you package a vehicle with the appropriate noise packaging to go with it you meet California standards, that you sell in California?

Mr. **Staadt.** Yes.

Professor **Plager.** Now, do you routinely package that vehicle the same way for other States as well?

Mr. **Staadt.** Yes. We have one package.

Professor **Plager.** You have one package?

Mr. **Staadt.** Yes.

Professor **Plager.** No options?

Mr. **Staadt.** No options which are allowed.

Professor **Plager.** No options which are allowed.

Mr. **Ringham.** Excuse me, I might just interrupt, Dick, since we are a multi-industry related product, company, I wanted to hit a technicality here; that is, what Dick says is totally true for the highway vehicles. For certain off-highway requirements we do that, with all our farm tractors and that kind of thing.

Professor **Plager.** That is a separate problem. Perhaps we should get to that sometime, but let's talk only about——

Mr. **Ringham.** There are separate hearings on that.

Professor **Plager.** Certainly earlier ones.

What about the comment that we heard earlier from some of the large vehicle manufacturers that it can't be done the way you are doing it?

You are obviously doing something wrong, I gather, because it's not supposed to be done this way because everybody has a different requirement.

Mr. **Ringham.** I think you will find there is a majority of one who said that.

Professor **Plager.** Thank you.

Mr. **Ringham.** I might further add that recently we became No. 1 in heavy-duty trucks.

Professor **PLAGER**. I can see why.

Dr. **MEYER**. I have one other question. Do you provide any assistance to your customer if he comes in with a special order package, such as putting a concrete mixer on one of your chassis? Or is this purely up to him, or do you have some relationship as an example, such as a concrete mixer driving in California will have to have a variance to travel down the highway or will have to meet their law?

Mr. **STAADT**. Well, the law in California, the user law in California is somewhat higher—not somewhat, but some higher than the manufacturer law, and the manufacturer law applies to the basic vehicle, and what the customer does with it, then, he has to worry about whether it does meet the user law. We cannot control what goes in the back of our trucks.

Dr. **MEYER**. I understand that. Thank you very much. We look forward to seeing you in Denver. Our next witness represents another industrial organization that participated in Atlanta, Ga., with us, and asked if they might appear here today. And I am most pleased to ask Mr. Hasten from the Caterpillar Tractor Co., if he still is of a mind to talk with us, to come and talk with us. Sir, nice to see you.

Mr. **HASTEN**. Thank you.

STATEMENT OF JACK HASTEN, CATEPILLAR TRACTOR CO.

Mr. **HASTEN**. Mr. Chairman, members of the panel, my name is Jack Hasten. I am manager of the products control department of Caterpillar Tractor Co., with headquarters in Peoria, Ill. I am here today to discuss our efforts in reducing noise levels of our diesel truck engines.

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This discussion will stress three major areas: Exhaust noise, cooling fan noise and the noises internally generated within the engine. My remarks are included as appendix NN in a more detailed treatment of this subject, eight copies of which are in your hands.*

Caterpillar is concerned about noise levels emanating from its truck engines as they are heard by both the truckdriver and the spectator. While we have done work which may be relevant to reduction of "in-cab" noises, our emphasis today will be on the noise levels heard by the so-called spectator.

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The noise heard by the spectator as a truck passes by is the result of a combination of many individual noises. A partial list of sources of such noises would include the transmission, chassis, trailer, body or cargo, aerodynamic noises, horns, tires, plus engine noises. It is important to remember that each of these noise sources must be treated individually in order to effect significant reductions of the total noise heard. Even a single component such as an engine has a large number of individual noise sources. It is common to discuss these under the three broad headings of exhaust, cooling fan, and a combination of mechanical and combustion noises.

We have studied exhaust noise in depth, yet much remains to be learned. What we do know is that exhaust mufflers are available which can effect significant reductions in noise at reasonable costs.

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* This material is on file at the Office of Noise Abatement and Control.

Acquiring good, reliable data on something which would appear to be as simple as a muffler is not really all that simple. This is a specially built muffler test facility located at our technical center.

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The building is as soundproof as we can practically make it. Engines are set up in this building and run under load, with the only external outlet from the engine being the exhaust stack. Mufflers can be attached to this stack such that the exhaust noise, muffled or unmuffled, can be measured in almost total isolation from other engine noises.

Not only does Caterpillar have such a facility, but in order to do joint development work most efficiently, our primary supplier of mufflers, the Donaldson Co., also uses this type of test facility. Caterpillar loans engines to Donaldson as we jointly work on the problem of developing better and better mufflers, to minimize both noise and back pressure.

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This shows the results of muffler development work done on one of our truck engines. With no muffler, the exhaust noise level measured 50 feet from the engine was 92.5 dBA. The first muffler applied reduced this to 78 dBA and resulted in a back pressure in the exhaust stack equivalent to 16 inches of water. The next muffler reduced the noise level to 74.5 dBA, but the back pressure increased rather drastically to 41 inches of water. Notice that the next muffler not only reduced the noise level by 3.5 dBA, but also reduced the back pressure to 32 inches of water.

You may have received conflicting information as to the harm done to diesel engines by the application of mufflers. Back pressure above certain levels can be detrimental to a diesel engine. Since this level varies with engine type, ratings, et cetera, we can only speak for Caterpillar on this matter. Our standards for maximum levels of back pressure on our engines are 20 inches of water for turbocharged engines and 25 inches of water for naturally aspirated engines.

The 1693 is a turbocharged engine, so we and Donaldson have to do additional work to lower the back pressure to 20 inches of water. I would emphasize the importance of such work, since the reduction of 21.5 dBA accomplished through the use of muffler "C" represents a reduction in the noise felt by our ears to less than one-fourth that of the unmuffled engine.

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Caterpillar is not limiting its work on diesel engine exhaust noise reduction to the application of mufflers. That work is extremely important in that the results are applicable relatively quickly. Longer range, we hope to accomplish further reductions by gaining a better understanding of the sources of exhaust noise. We are doing very basic research on the effects of engine speed, load, turbocharging and valve lash on exhaust noise.

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Next, we would like to share with you some of the work we are doing to reduce noise generated by the engine cooling fan. Very basic to this work is an understanding of the phenomena that a rather direct relationship exists between fan speed and fan noise. This chart shows that the noise generated by a typical fan used on one of our engines varies from 100 decibels at 2,000 r.p.m. to 85 decibels at 1,000 r.p.m. A plot of airflow versus fan speed would have a similar shape. The noise reduction of 15 decibels in our illustration would be achievable only if a reduction of airflow on the order of one-half would be acceptable.

In attacking this problem on our vehicular products, we are finding that in nearly every instance, larger diameter, slower speed fans are required. In most cases, a larger radiator is also a necessity. Reduction of spectator fan noise levels involve some very delicate tradeoffs. These are not limited to the economics of larger fans and radiators. Intangibles such as the effect on safety as these larger components adversely affect driver visibility must be taken into account.

[Showing of next slide in series.]

As with exhaust noise and mufflers, Caterpillar is not taking a complacent attitude that it is up to the fan and radiator manufacturers to provide solutions to fan noise problems. We are doing basic research in such areas as uneven spacing of fan blades, guide vanes, basic radiator configuration, annular shrouding of fans, and fans with airfoil blading.

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Moving now to the internally generated noises of the engine itself, I'm sure you can appreciate that this is a very complex subject area. As has been stressed so often, noise reduction work increases in complexity as the number of individual sources of noise increases. This is a list of sources of engine noise by broad categories. Each of these, combustion, piston slap, bearing clearance, valve train, turbocharger, fuel system, gear trains, and auxiliaries represent multiple noise sources within each broad category.

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As we started to home in on some of these individual sources, we found that highly specialized test facilities are required. Following a worldwide investigation in 1969, Caterpillar contracted with List-Rosen-Wittek Associates, Inc. of Graz, Austria, to conduct a detailed investigation into the sources and magnitudes of noises generated internally by a production model 1673 diesel truck engine. In our opinion Dr. List and his people had the most advanced technology, both in terms of people and facilities, available anywhere in the world to teach us the maximum in the minimum amount of time. This shows that engine in the List semianechoic test cell where this work was done.

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We now have our own semianechoic test cell and are hard at work closing any technology gaps which may exist. Incidentally, the List people felt that acoustic treatment of such components as the oil pan, valve cover and timing gear cover might result in a reduction of noise levels at a distance of one meter on the order of 3 to 4 dBA. Extensive internal redesign would, in their view, yield an additional 2 to 3 dBA reduction. Because the 1673 was basically a very quiet engine, the List report concluded that reduction of internally generated noise beyond 5 to 7 dBA could only be achieved by encapsulating the engine.

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Here is an example of what such an enclosure might look like. This four-cylinder Caterpillar D330 engine was completely enclosed in fiberglass. This early work has not yielded very promising results. We had hoped to achieve something on the order of a 20 dBA reduction, but wound up with only about six. Work of this nature will continue, but we recognize that this is a long-range development program.

In the meantime we are doing what we can, given the current state-of-the-art, with respect to reducing noise levels by acoustical engine enclosures on our machines, as represented by this D8 tractor. A thorough description of that work is contained in the testimony we submitted at the Atlanta hearing on July 8.

In our opinion, much of the technology we have utilized on our own prime products would be applicable to noise suppression work on the engine enclosure of a truck. We stand ready, willing, and even anxious to share that technology with interested truck manufacturers.

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Other data we are gathering and analyzing relate to differences in noise levels emanating from different types of engines. This chart shows the noise levels emanating from two different types of diesel engines at conditions of high idle and at full load of about 300 horsepower. The precombustion chamber diesel, shown on the bottom, is some 10 decibels quieter than the direct injection engine shown on the top. Also, notice that the prechamber engine noise level is much less affected by variation in load than is the direct injection engine. Since Caterpillar builds both types of these engines, we want to understand these differences more completely.

[Showing of next slide in series.]

In Atlanta, we told you what we are doing to build quieter construction machinery. We could do that because we build the entire machine. Today, we have confined our remarks to the only component of an on-highway truck we build, the diesel engine. We are not qualified to make specific recommendations as to how to build a quieter truck, rather how to build a quieter diesel truck engine.

Let me generalize with you a moment and suggest that there could be three general approaches taken to building quieter diesel truck engines. We, as an engine manufacturer, could go it alone, sharing our findings with no one.

[Showing of next slide in series.]

Truck manufacturers could also try to attack the problem, seeking no counsel from the engine people. Alternatively, the engine and truck manufacturers can work jointly on the problem, treating the engine and truck as a system.

In such a working relationship, we regard it as our responsibility to work as we have with people like Donaldson to develop the best possible exhaust muffler for each of our engines. It is then our responsibility to share such information with the truck manufacturers. Similarly, we must continue to work on cooling system noise reduction. Here again, we owe the truck manufacturers specific recommendations as to radiator and fan combinations which will minimize noise, yet adequately cool our engines. Thirdly, as we do noise suppression work on our own vehicular products, we are learning how to acoustically treat engine enclosures. We do not feel we have a responsibility to design truck engine enclosures. We will, however, welcome the opportunity to share our technology in this area with those truck manufacturers who seek it.

Based on the work we have done on our own vehicles, Caterpillar feels it can reduce diesel truck engine noise to certain levels working independently. If those levels prove unacceptable, it is our opinion that further reductions may be achieved most efficiently by treating the engine and truck as a system.

Thank you, gentlemen.

Dr. MEYER. Mr. Hasten, thank you very much for an excellent presentation, and also I would like to commend you for your attitude of standing ready to share your knowledge with those who need it—meaning the industry at large and the government at all levels. I think it's an excellent attitude, and one which we appreciate very much, particularly since one of the responsibilities the Environmental Protection Agency will have, assuming it gets the legislation that Congress is now considering, will be not only setting standards, but setting those standards in advance of providing information as to the technology that is available. As you know, one of our fundamental approaches to standard setting is to come up with first an estimation of what the problem is and where the noise or other environmental insult comes from and then to find the ranges of effect and what the means of control are. And I look forward to our communicating with you further in that regard, along with your other colleagues in the industry. I think this is a most good position to take. It's evidence of good corporate citizenship. Panel?

Dr. WHITCOMB. Indeed you have a tremendous program going on, and you should be complimented on it.

Mr. HASTEN. Thank you.

Dr. WHITCOMB. Two things occur to me; one is with the encapsulated engine, would it be feasible to attempt to look into a diesel, electric diesel to get rid of transmission problems and things like that more fully encapsulated engine—just a comment, unless you have worked on it. The other thing, in air conditioning units you get better airflow often with the cage type fan, and certainly much quieter transmission of air. Have you looked into a nonblade, but rather a cage-type fan with trucks? And third, I don't know why you test mufflers when all you need is a larger volume to get noise reduction—I am being facetious.

Mr. HASTEN. Yes, I know you are. We have done work in the areas you mention. It's not included as material, it's not of the stage, I think, where you would want to share it openly. We would be happy to share it with any of your people. It's not in production.

Professor PLAGER. Mr. Hasten, how long has Caterpillar had this program of research and development for quieting of the noise program?

Mr. HASTEN. Well, I would say that this effort was intensified really starting in the early sixties; I think it's fair to say that prior to the early sixties we built, you know, the hew and cry was for more horsepower and more performance, and it wasn't the orientation, indeed, on the part of the user or society as a whole—we weren't aware that we were being as obnoxious as we were, I guess.

Professor **Plager**. What was the impetus for your company undertaking this program as early as the sixties?

Mr. **Hasten**. An awareness—I have talked here strictly about truck engines, but the operator on one of our larger earthmoving machines is subjected to some pretty high noise levels, and we began to get reaction to that.

I think things like the application of the turbocharger to our engine started to teach us that the turbocharger itself was a good silencing device; operators liked the turbocharger—the turbocharged tractor. It was these kinds of things that got us started on this, and I would say in all candor that as this kind of thing has gained more prominence, and laws have been passed, it's obviously accelerated this activity. I don't want to suggest that it hasn't.

Professor **Plager**. But is it fair to say this was in the nature of a self-imposed corporate responsibility, at the outset, at least?

Mr. **Hasten**. Yes, sir.

Professor **Plager**. Fine. I would like to, as a downstate Illinoisan, Mr. Chairman, I would like the record to show that Caterpillar is a downstate Illinois firm.

Dr. **Meyer**. The record will so show.

Mr. **Hinton**. I just have one brief question. Can you tell us whether your obvious concern for the environmental effects of your products have paid off, do you think, in the marketplace?

Mr. **Hasten**. Oh, that is a little hard to say at this point. If you had heard our story in Atlanta, and some of the others, you would understand we are in quite a race to meet some of the OSHA requirements on our equipment, which include, in our opinion—although I guess there is a difference of legal opinion on this—the noise criteria; it is now part of the Occupational Health Safety Act. It's not a moratorium declared until January of 1972. We are scrambling on some of our machines to meet this, so I am not going to stand up here and say we have a great competitive edge in our construction machinery, and that we are reaping tremendous benefits from it. We think we will, but whether it's commercial, there are good competitive reasons to do these things, unquestionably.

Professor **Kerrebrock**. Two brief questions. One is are you working on the gas turbine still?

Mr. **Hasten**. Yes, sir.

Professor **Kerrebrock**. Do you see it as a promising solution to any of these problems, or is it too far off?

Mr. **Hasten**. The work that we are—you have an illustration here in the brochure of an on-highway truck with a Caterpillar turbine engine in it. I have to say about what the man from International said, that engine was not designed for on-highway truck use. Its fuel consumption was horrible. No trucker would have bought it.

Our experience suggests that in order to be competitive, a turbine engine has to be a regenerative type to be competitive for on-highway use, and the turbines we have looked at that are in the horsepower range that we are interested in here, let's say, 300 to 500 horsepower, by the time you put a regenerative device on it, and then adequate intake air muffling, and deal with a higher pitched noise that you get compared with a diesel engine, we are rather persuaded that the magnitude of the two jobs, of quieting one of the two engines to a given level, are comparable.

Now, 20 years from now this could all be different, but from the work we have done, that is about as succinctly as I can answer your question. We see no real edge for either.

Professor **Kerrebrock**. Okay. Another question; you broke down this problem of mechanical noise a little more than anyone else has, and you mentioned some things like valve lash and piston slap and so on; I wonder if you have any feeling at all for how this mechanical noise problem varies with the age of the engine. Can it get very much worse as the engine goes through the wear cycle, will it give problems in regulation?

Mr. **Kasten**. Yes, it will. There is a chart in the book that I didn't use here that shows the effects on valve lash. I forget the exact details, but there is something like, for thirty-five thousandths additional valve lash the noise level at 1 octave band frequency was something on the order of 10 or—10 dB higher, so—not dBA, but dB, but it was in a frequency range where dBA and dB would be very comparable.

The effect of bearing wear I am sure is going to affect things like gear noise as the crankshaft bearings wear, and the timing gears no longer mesh like they did when they were new gears are one of the major noise sources in any piece of machinery, and they certainly are in an engine, in maintaining very accurate profiles on gears is extremely important.

We are doing a lot of work on that. We could fill a book three times that thick just on what we are doing on gears, so as a piece of machinery wears and you lose those fine precision fits that you build into the original engine, it's going to get noisier and, yes, sir, you are going to have a problem that the operator of this truck, who might normally have gotten half a million miles between major engine overhauls, and still could, from other performance criteria might, because of a noise limitation you place on him, cut that in half. I can't give you a specific answer, but I can tell you that that possibility exists.

Professor **Kerrebrock**. Okay. Thank you.

Dr. **Meyer**. Thank you again, sir, for a very explicit and informative presentation. I had a question handed to me, sir, by a member of the audience. It's more or less of a specific technical item; if the person who asked wanted to have this question answered—which has to do with specific installation, specific reduction—would identify himself, would you mind giving him the answer to the question?

Mr. **Hasten**. Be glad to.

Dr. **Meyer**. In the interest of time. Thank you.

Mr. Joseph Kigin will now put the show on the road. He will talk about the tire meeting the concrete and asphalt, and tell us, if he is still of a mind to do so, of what we can do about automobile and truck tires which—and it seems sort of fitting, after a long day, as I said, to where this is, I believe some of our younger friends say, the tire does meet the highway.

STATEMENT OF JOSEPH KIGIN, RUBBER MANUFACTURERS ASSOCIATION

Mr. **Kigin**. Dr. Meyer, gentlemen of the panel, I might say at 20 minutes until 7, it is a pleasure to be part of the anchor team after a rather long day's proceedings. I commend you for your attention and patience.

As you, individually, Dr. Meyer, are aware of my function with the tire industry, it is that of government relations, and this, as you might imagine, goes directly into areas where tire noise does go into play, or consideration.

The question that we want to explore with you, the issue we want to discuss is that of tire noise, its existence, the degree of resolution that might be addressed to the problem, and my only prefacing remark would be that it is a complex problem—not one that is apparently simple.

The complexity I think would more adequately be discussed before this panel by my two associates, the first of whom is Mr. Seymour Lippmann from Uniroyal, one of the Nation's major tire manufacturers.

As an introduction to him I might say he has been as individually active in tire noise research and related issues as I think anyone in the industry. He is the chairman of the SAE Special Committee on Truck Tire Noise. He has been quite in the forefront of our industry's collective research on truck tire noise, as well as that of his own company.

Additionally I am accompanied today by Mr. Herbert Reinert, who is the secretary of our association's Environment Committee. Other than the immediate discipline of acoustical problems, Mr. Reinert is quite conversed in our overall ecological programs. The essential presentation Mr. Lippmann will make. To the extent there are questions you may wish to have answered—and I detect from the previous tenor of questions to your witnesses, you may have something to discuss—we will be very pleased, and we would hope that our presentation today might be the start of a continuing and effective dialog with the EPA. Sy, if you would, please.

Mr. **Lippmann**. Thank you.

Dr. **Meyer**: Proceed.

STATEMENT OF SEYMOUR LIPPMAN, UNIROYAL

Mr. **Lippmann**. Due to the short period between the announcement of this meeting and the requirement for a written copy, we sent one out that did not represent total industry viewpoint, and as a result of this there will be an additional submission which probably is more representative, and the submission I have placed before you was done with telephone communication to assure that this is as the industry understands it.

Dr. **Meyer**. We will be happy to receive, sir, your additional submission, and will incorporate it into the record, along with this initial one.[*]

Mr. **Lippmann**. What I would like to do, considering the significance of tire noise, as has been pointed out by a number of people, is to indicate what the technical problems are—and I am sure that you will want to question me on what limitations we know of at the moment, and where we are going—and I will try and take as little time as possible. I realize that you are all quite fatigued. There are two basically different types of tires that are made for trucks; I am going to talk primarily of trucks.

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[*] This material is on file at the Office of Noise Abatement and Control.

Dr. **Meyer**. Yes, sir.

Mr. **Lippmann**. One type is a type of tire that is placed on the driving wheels of the truck, and provides the accelerating torque. The other tires are on trailing wheels and steering wheels; they are free rolling, for the most part, except when braking takes place.

Although this and a special type of tire is used here, it's the type of tire that was shown in a previous slide, and it's represented by structural elements in the tread that are largely parallel to the axis rotation of the tire, and in the industry we refer to these as lateral as distinct from circumferential orientation. The ability to deliver the driving torque on dry and wet surfaces without causing the tread to crack and tear means that there must be sufficient number of lateral edges present in the contact patch between tire and road.

These edges must be backed-up mechanically; there must be channels for the elimination of water on wet surfaces, and the supporting structures with these edges must have the right amount of flexibility; if they are too flexible, obviously you will have buckling, and you will not have transmission of torque. If they are too stiff, then primarily what you will get is wear at the edges, at the leading edges of these elements, they will round off, and again they will not provide adequate, an adequate amount of traction.

In addition to this there is another technical requirement; the materials of tires as they flex generate heat. We refer to it as mechanical hysteresis in our business. This heat has to be brought out without raising the internal temperature of the tire excessively. Tire materials are very sensitive in their fatigue properties in this range, and therefore for reasons of safety, to keep the tires intact, one must have short cooling paths. Now, this is permissible in a lateral bar design such as you saw, or is accomplished there by having wide lateral grooves in between these bars.

Well, when all these factors are put together there is one limitation that comes up, and that is the lug spacing that you can have. This is restricted rather severely to a limited range of approximately 3 to 4 inches.

The limitation on lug spacing does several things. One of them is it determines the basic frequency of the tire. It also limits what one might do in trying to use a regular spacing to break up frequency concentrations; you are not going to go too far that way. The industry has done a great deal in that direction —as much as it can.

Now, the design considerations for nondrive axle tires are similar, but relaxed because the continuous driving torque is not demanded of the tire. There are thousands of times difference, different in the integral, let's say, of driving torque against time, because—not driving torque, but torque, torque application. It's for that reason these tires do not have to have the lateral designs —as a matter of fact, lateral designs don't work well in them.

Now, in addition to the properties required for traction, there are another set of properties required for tread wear. The lateral bar is longer wearing than the circumference rib, in service where there is substantial tractive efforts; however, in the absence of sustained tractive efforts, and particularly where there is steering, lateral bar designs develop excessive heel and toe wear, and cannot be used.

The tread depth possible with lateral bars on drive axle portions is about—well, I have a number here, 0.725, in that order, and is about half an inch in rib designs. This is determined by cooling paths and wear pattern differences.

The net result is that cross bar tires typically offer about two and a half times the mileage of continuous rib tires on drive axle. That is going from something in the order of 40,000 miles in the continuous rib type to about 100,000 miles in the lateral bar type, and you can see that is going to have implications.

Now, I would like to talk—that is some basic information relating to the mechanics of tires necessary to carry out some of its performance requirements.

Now, how about the noise? Where does it come from? When a freely rotating tire without tractive effort rolls along the ground, the portion of the tread in the contact zone undergoes compression in the circumferential direction. This compression is released discontinuously, and the air and the treading itself is exited by this discontinuous action. That, of course, is the source of noise, and this is primarily at the exit of contact.

In some archaic designs, and inadvertently in some designs that manufacturers put out, there is another phenomenon that occasionally takes place, and that is a cupping action where there is a concave surface developed or designed into the tire, and this concave surface causes a cup compression of air discontinuously, and release of this compressed air or its sucking in of the air at the exit end of contact discontinuously, and these are the noisier tires by far.

This cupping process leads to the higher level of noise—highest level of noise, but it is a temporary thing, and to my knowledge, no manufacturer is currently putting out tires of this sort, no original tire manufacturer.

The number of tread elements—and, of course, this determines the power level—the number of these elements times the velocity that gives you the sound power radiated; were it not for the fact that speed introduces other effects, this would be very simple; but speed does introduce another effect, or a series of other effects. One of them is better acoustical coupling—as the speed goes up between the tread element and the surrounding air, and also because of the effect of speed on the slippage process that leads to this discontinuous action, there is greater energy stored in the snapping action at higher speeds, so the net results that many measurements have shown that in the range of interest, or the range of experimentation, and the range of interest, that there is about 3.3 dB increase per 10 miles an hour. This has been alluded to before in rather descriptive terms, but not in quantitative terms.

We also find surprisingly, that smooth road surfaces are, create more noise than rough road surfaces. Well, it's not surprising when you get to look at the mechanism a little bit, the smooth surfaces are more prone to cause discontinuous slipping which is periodically regulated. The rough surfaces cause slipping to occur prematurely, with the release of compression and the excitation of the air, or lower level.

The frequency patterns of interest—or rather the frequency band of interest, because there are also resonances in the tire that affect, obviously, the snapping elements resonate, and the structure of the tire resonates in response to it, and all things put together, the frequency band of interest is from about 200 hertz to about 2,000 hertz and as far as we can tell at the present time, the radiation is in a wedge, primarily from the exit contact radiating out—there is radiation from the side wall, but we have not run this down into a detailed radiation pattern at the present time.

The National Bureau of Standards, with its wall of silence tests, is attempting to do that; however, the data as presently analyzed are not in a form that allow one to make deductions of this sort.

Evaluation of truck tire annoyance. The observer is generally impressed with the dominant tones in the sound radiated by tires, and therefore one would expect an evaluation procedure to emphasize the tonal concentrations in the noise.

The jury tests thus far have been inconclusive on this point, and the cycle acoustical reaction is still under investigation. The dBA weighted level at fast response has been demonstrated to be an important factor.

We have taken this as a sequential analysis in which we will get first an approximation, and then a refinement, and so on, and our sequential analysis has indicated that dBA at fast response is important, and it can be supplemented by energy measurements in the 400 to 600 hertz band. At that point we find that when we have made the supplementation, we find that our ability to predict jury reactions is within jury error. However, that doesn't necessarily prove anything; it's nice that that happens, and it means that possibly this can lead to a testing standard for truck tire noise. However, we also find the dBA at slow responses as effective as that, and that may be because of the duration of the tonal concentrations. Therefore, not everyone in the industry, I might say, is satisfied with that at the moment, and a lot of people who have been involved in this still feel that it will ultimately turn out to be an appropriate weighting of narrow frequency bands, and perhaps the third octave analyses that are typical are not sufficiently—do not sufficiently resolve the spectrum, and we may have to go to 10 octaves. But that would make it very, very difficult to set up any kind of testing standard.

Now, we also find—or I should say the Wallops Island tests of the National Bureau of Standards have indicated that the rear trailer axles are the greatest contributor of radiated noise; equivalent tires placed on various axle positions, and this test I am referring to was done with a 10-axle truck, and this is in keeping with what we know about the radiation pattern from tires.

We would gather from this that apparently the noise radiated by the front, the earlier tires, the tires ahead of the last set of tires get caught under the vehicle, and do not radiate out as effectively.

The control of tread noise through rubber is a very difficult problem. Everyone in the industry has looked at it, and here we have a mechanical—we have, as someone pointed out before, we have a dichotomy of requirements. The tread rubbers also necessarily produce more heat, and this precludes their use. We can't even use tread materials that are used for passenger tires in truck tires, and we have developed materials for passenger tires that we very much would like to use in truck tires. The processing is better; cost is better; reliability, so on and so forth, and wear is better—but not under the circumstances of truck tire usage, because there we run into heat failures, and jeopardize the safety of the vehicle.

Another section I have here is on the ongoing technical actions for controlling truck tire sound levels that I am aware of, and this may be expanded as we hear from other members of the industry.

Since 1968 a subcommittee of the Society of Automotive Engineers has been working on the standard procedure for manufacturers evaluation of these tire noises, and this work is in its final stages at the present time, and we hope we will have this to offer the industry and the government soon.

The Department of Transportation has been doing work on acoustical radiation patterns, and hopefully this will have something to offer as well. They are also doing work on a study of noise from various locations on the truck.

The tire manufacturers that are active in attempting to find solutions that do not significantly impair the transportation function of truck tires; this involves at least compromises among those items noted in the earlier discussion. There are such factors as tread designs that do not wear into cups, and that do not wear irregularly to promote element snapping, reduction of undesirable shears, and compressions—that again would augment snapping, best possible spacings allowable moduli, and damping properties of the tread and materials, et cetera.

Now, there are some economic and social implications to the approaches already advanced, and I have heard a few today that fortunately I had thought of before. One of these is the elimination of cross bar tires. Well, industrial advantages—it's advantageous to the tire industry to do this because rib tires wear more rapidly. However, it's disadvantageous to the trucking industry because of increased operating cost and down time for tire changes. Generally that approach results in increased cost of trucks, of truck transportation, which will ultimately be passed on to product and service costs.

Another thing that has been mentioned—I was surprised it came up here—but it did, it shows what a sharp group we have. Reduction of allowable top speed, since the sound level increases 3.3 dBA per ten miles per hour. Well, obviously that has its social and economic disadvantages. Additional cost of goods and transportation to the general public, impaired capacity of the road system. I think that is about all I have to offer.

Dr. **Meyer**. Well, thank you very much. Before I ask the panel to ask some questions, I noted one technical point in here that was rather intriguing to me, namely the comment regarding the distance attenuation factor perhaps not following the inverse square law.

Mr. **Lippmann**. Yes.

Mr. **Kigin**. Yes.

Dr. **Meyer**. The reason I am interested in this is that it sort of ties in with some observations; we have been working with the Department of Transportation on the problem of continually looking at a continuous stream of traffic in a freeway area, or an interstate highway. In at least one set of measurements we have shown that for approximately 30 to 40 percent of the time, in any hour—and it doesn't make a difference whether it's morning peak traffic, night, 2 o'clock in the morning or what, at a distance of about 300 feet and up to an altitude of about 50 feet in the air, along the freeway, the sound pressure levels measured on the A-scale standard sound level meter ran between 80 and 85 dBA. And, of course, it is mostly tire noise, so I am wondering about this lessened reduction factor, because you know when you add this up and say, well, this truck passed this, some of these other standards that we are looking at of 90 and 95 dBA, what does it mean 300 and 400 feet away? A lot of the calculations have been made on the old inverse square 60–B, each time you double the distance, and this may be very significant, I would think.

Mr. **Lippmann**. Yes. It's hard to know at this point how to interpret it. I can give some possible interpretations.

Dr. **Meyer**. Rather than doing it now and taking up the time, I would like for you just to amplify on that for the record, and for the technical people here to take a look at it. It's a scientific and technical question. We could all look at it, I think. Panel?

Dr. **Whitcomb**. I have two or three questions.

One is based on a statement made on page 3 of your testimony, under the item of frequencies, where it's stated that because of typical element spacing at 50 m.p.h. the dominant frequency in traction tires is 200 to 300 Hertz, and is 280 to 420 Hertz at 70 m.p.h.

Mr. **Lippmann**. Yes.

Dr. **Whitcomb**. And with resonances going up correspondingly to higher frequencies, it sort of gives you a hint that you are approaching the tympanic curve of the human ear, and its maximum response area. Is it possible to get ultimate spacing wider than that so that you can stay down at the lower frequency without hurting the traction characteristics, or the drive characteristics?

Mr. **Lippmann**. Not to our knowledge. You see, this is what has led to that; it would be very easy for us to meet it if everything could be done that we would like to do.

Dr. **Whitcomb**. Yes.

Mr. **Lippmann**. Just to change the spacing, we would walk down the A-response curve; by doing nothing more than changing the spacing, you would have the same—you could have even more sound power per element and show an improvement if we could do that. We don't feel that we can do this and preserve the function.

Dr. **Whitcomb**. The next question, have you systematically run a research program where you look at noise characteristics as a function of speeds, and a function of various types of tread designs, and is this available somewhere anywhere?

Mr. **LIPPMANN**. Well, the National Bureau of Standards at Wallops Island did carry out such a study. They have one report out now. They are still in the process of carrying out this study. I woud think in about 8 or 9 months they will have their final report out.

Dr. **WHITCOMB**. And they are looking at several treads?

Mr. **LIPPMANN**. They are looking at many different types of treads.

Dr. **WHITCOMB**. Then third, I have heard that the typical recapped tread which is put on a truck tire may be three or four times during its lifetime, is one of the worst noise sources. Is this true, in your opinion? And if so, why is it different from firstline tires?

Mr. **LIPPMANN**. There is a particular design on the market that really is a carryover from a past period. These molds are still out, and the small recap shops don't see the reason to throw the mold away.

Dr. **WHITCOMB**. But this tread has no virtue over the other treads?

Mr. **LIPPMANN**. No. Recaps can be made to be as effective as new tread design, in my opinion.

Dr. **WHITCOMB**. Finally, there used to be a tire on the market called the Royalmaster, dating back 20 years, maybe.

Mr. **LIPPMANN**. Right.

Dr. **WHITCOMB**. It probably was very quiet, I would think, but was it bad in terms of traction?

Mr. **LIPPMANN**. Well, there have been continual developments in tires. They all look alike, I know, but the tread life and the tractive properties, the skid resistance of tires, the steering properties of tires have all changed through the years. We couldn't possibly go back to designs of that period at this time.

Professor **PLAGER**. Just a quick question.

Mr. **LIPPMANN**. Surely.

Professor **PLAGER**. On this reduction-of-speed idea——

Mr. **LIPPMANN**. Yes.

Professor **PLAGER**. Do tires wear more at high speeds than at lower speeds?

Mr. **LIPPMANN**. Yes, I think so.

Professor **PLAGER**. So that the costs to the industry of slower speeds might be offset by the savings in tire wear?

Mr. **LIPPMANN**. Well, I doubt that that balance would be made because you are balancing the miles per dollar of a tire against the total operating cost of the vehicle, which involves labor and so on.

Professor **PLAGER**. Right. I am sure there are economic discontinuities.

Mr. **LIPPMANN**. Yes.

Professor **PLAGER**. OK. Having heard your presentation, and glanced through your paper, I have at least a little better feel for the problem, having heard the earlier gentlemen, all of whom referred to you as a source of solution. What is the solution, or what are the alternatives? What are you going to do to solve our problems for us?

Mr. **LIPPMANN**. The industry at the present time, I know what my own options are for making developments, and I have spoken to other people just briefly at this point, and, of course, over many years on various items get some idea of what their options are. It looks pretty dreary at the present time.

I think that some advantages can be gained by eliminating particularly noisy designs, designs that have been misengineered and developed, let's say, improper wear profiles on the surface—eliminate some of the compressions, eliminate the tendency of tires to wear into cups, and that sort of thing.

I think that can be done, and I think we would see a definite improvement, but I notice that some of the truck manufacturing people see much more improvement in tires than we do. I just don't know where it's coming from, and I also am of the opinion that the present legislation is legislating the impossible as far as present technology is concerned.

Now, of course, technology can break at any time, and someone can come up with a bright idea, or new material, or new way of making a tire, or something like this could come about, but that is looking at the progress from the present time, with the present available knowledge, I don't see it.

Professor **PLAGER**. Square wheels may be the answer.

Mr. **HINTON**. Mr. Lippmann, I know that involved as you are with SAE committees and cooperative engineering programs that you are pooling your knowledge to try to come up with some technical solutions to this problem.

I was a little surprised that you didn't have more to say about tread design as a factor, but apparently it's not as large a factor as I thought it was. Maybe you don't have as many options with truck tires as you do with automobiles.

Mr. **LIPPMANN**. What I tried to do was to cover the essential characteristics of tread designs rather than the details of them——

Mr. **HINTON**. I see.

Mr. **LIPPMANN**. That pertain to this particular subject.

Mr. **HINTON**. Well, Mr. Plager asked about the correlation of safety. I guess he means the coefficient of friction with tread design.

Professor **PLAGER**. A number of people said changing the tread designs makes them unsafe, but nobody had any data; is there some data on this subject?

Mr. **LIPPMANN**. Well, I don't have data as such, numerical data, as I do in this other area to offer you, but I do have the many conversations I have had with representatives of trucking people, and they tell me that they need the traction, the traction and the control properties are directly related to the safety, and I posed the same question, you know, as far as our industry is concerned it would be great if we could get rid of the cross-lug tires and sell more tires, see, but—well, okay, is it possible to get rid of them? And they say, no, they are also instrumental in providing us with a control that we need under braking conditions, avoiding jackknifing and that sort of thing.

Professor **PLAGER**. Is this the manufacturer or the operator?

Mr. **LIPPMANN**. Operator representatives.

Professor PLAGER. Okay, because the manufacturer says you are the one who tells them, so it's the operators who are the source, then.

Mr. LIPPMANN. Really, for all of us we may tell them, but the way we find out what to tell them is by placing tires, experimental tires, in service with operators and find out what has happened, what the reactions are.

Professor PLAGER. Thank you.

Dr. MEYER. Panel?

Professor KERREBROCK. Just briefly, if I understand correctly, now, you are talking of these traction tires, the crossbar lugs specifically, but what about the general question of tractive effort versus noise generation, or the free-rolling tires for automobiles tires? Do you have data on this tradeoff?

Mr. LIPPMANN. Well, normally the free-rolling tires are not called on to exert a great deal of traction, except when braking.

Professor KERREBROCK. Yes.

Mr. LIPPMANN. Right.

Professor KERREBROCK. Which is the safety problem.

Mr. LIPPMANN. Yes, sir; it is a safety problem, too, and there hasn't been any analysis made, to my knowledge, of the tradeoff involved by reducing the tractive ability of free-rolling tires

Professor KERREBROCK. Will it be done by the Bureau of Standards in this study that they are carrying on?

Mr. LIPPMANN. Well, I don't see—you see, the level there is quite modest. It's not the key matter—it is a key matter as you go down to these lower and lower levels, of course, it will eventually become important, but the major effort applied so far in trying to understand the problem and come up with solutions has been to crossbar tires.

Professor KERREBROCK. I see.

Dr. MEYER. Thank you very much for helping get us into perspective in this problem. It's one that our Agency, in conjunction with the Federal Highway Administration, Department of Transportation, and National Bureau of Standards is going to have to look at with you in the future to have a meaningful approach to setting standards. I want to thank the panel for the long day they have spent here with me. We normally don't like to have these things run this long, but obvious circumstances prevented us from having this stretched out over 3 days, which we would have liked to have done.

I appreciate the patience of the witnesses, particularly those toward the end of the day who stayed with us, and understood our problems, and I appreciate those in the audience who have been interested enough to stay this long. And on that note of appreciation from the Federal Government, this session of this hearing is recessed until tomorrow morning at 9 a.m.

(Whereupon, at 8 p.m., the hearings were recessed to 9 a.m., on Thursday, July 29, 1971.)

ENVIRONMENTAL PROTECTION AGENCY

PUBLIC HEARING ON MANUFACTURING AND TRANSPORTATION NOISE (HIGHWAY AND AIR)

THURSDAY, JULY 29, 1971

PROCEEDINGS

Dr. **MEYER.** Ladies and gentlemen, I hereby convene the third session of the hearing on noise conducted by the U.S. Environmental Protection Agency in accordance with a directive from the U.S. Congress, contained in title IV of Public Law 91–604. I am Alvin Meyer, the Director of the Office of Noise Abatement and Control of the Environmental Protection Agency, and I am accompanied today, as members of a hearing panel who will assist me in receiving information and analyzing it and in making recommendations based thereon, by Dr. Milton A. Whitcomb, to my extreme left; Prof. Sheldon J. Plager; Mr. Henry Martin, to my right; Lloyd Hinton, to my left; and Prof. John Kerrebrock.

What I have to say at the outset of this may be redundant in view of what was said yesterday, but since there are new faces in the audience, it is worthwhile to be somewhat repetitive and point out the authorities under which this hearing is held, its purpose, its scope, and the manner in which it will be conducted. The act of Congress I cited directed that the Administrator of the Environmental Protection Agency prepare a report to the Congress and submit it by the 30th of December 1971, covering all aspects of the noise problem, methods of control, and what might be done about it, both in the near term and in the longer term. Congress also directed that in preparing that report the Administrator would hold a series of public hearings. These public hearings are national in scope. They are to deal with the problems covered by the report. But in holding them we realize that it is important not only to talk about specifics of the problems associated with construction equipment and transportation equipment or noise as it affects wildlife, since these are some of the things the Congress told us to look at and on which to obtain views of various public interest, but to also gain knowledge of the effects of noise and to foster ideas concerning noise control. That is the scope of these hearings.

We are conducting the hearings, in general, according to the rules of the Committee on Government Operation of the House of Representatives of the U.S. Congress. Under those rules, witnesses appear, after having submitted their request to make a presentation. We have asked that they furnish the committee with a printed or typed transcript of what they are going to say. No questions are allowed directly from the floor. If someone sees or hears something that they would like to ask a question about, they may submit the question in writing to the clerk, or the identified young ladies, or the young gentleman who is working with us, and we will consider the answer or arrange to get the answer to the question.

I would like to, at the outset of this hearing, state that we are most appreciative of the interest of the large group of people who have evidenced concern about noise in Chicago.

One of our staff assistants, Mr. Douglas Laycock, has prepared an excellent review of what is going on, both in the city and the county, and in the State, and has provided this to us for our use. It will be included in the official record to the Congress.

Without further ado, then, I would like to proceed with this hearing. We have a large group of people who have asked to appear. I would ask the speakers' indulgence in recognizing that there are other people on the schedule and to try to hold their time of presentation to approximately 10 minutes maximum, so that if there are any questions from the committee, there will be an opportunity for us to ask them.

With that introductory remark, then, I ask Dr. Richard Marcus, a member of the Laryngological and Otological Society of Chicago —or I guess it's the Chicago Laryngological and Otological Society. Dr. Marcus, we are glad to have you here, sir. I look forward to what you are going to tell us.

Dr. **Marcus**. Dr. Meyer and members of this panel, I am representing the Chicago Laryngological and Otological Society this morning, and I had hoped—rather, we had hoped that Dr. Meyer Fox, who is chairman of our Industrial Health Committee for the Chicago Laryngological and Otological Society, would be here. Unfortunately he could not make it at this time. He has prepared a statement, which I will submit to you at a later time. Dr. Fox is one of the major authorities in the field of industrial health, and I note the smile on Dr. Meyer's face—a smile of recognition, I am sure.

Dr. **Meyer**. Yes; the Chair is familiar with Dr. Fox, and is sorry that he isn't here, but will you convey to him my regards please, sir.

Dr. **Marcus**. Thank you very much. I am chairman of the School and Public Health Committee of the Chicago Laryngological and Otological Society, and have spent a number of years of my work in the field of otology with children, and, of course, many adults, too, those who would see fit to consult me. I will pass over the introductory remarks, which I am sure will appear in your record, which gives due consideration and recognition to all the men of our society, and elsewhere, who have done work in the field, and move directly, then, into the presentation.

STATEMENT OF RICHARD MARCUS, CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY

Dr. MARCUS. As otologists, we are interested in the prevention and alleviation of deafness. Whatever causes or may cause hearing loss demands our attention, and, as is well-known, certain types of noise may do so. As physicians, we are also interested in other effects of noise on us as humans, on animals, and on our natural environment. As citizens, we are deeply concerned about the disturbing, distressing, and intrusive effects of unwanted sound.

We recognize that sound is the accompaniment of all movement and activity, and, therefore, provides a background of life which comforts us reminding us that we are alive. Ultimate silence is most uncomfortable, eerie, and unearthly. However, in present day civilization, there has been too much artificially produced sound and noise. We also recognize that many people in many fields have been and continue to be concerned with this problem. We are proud to number many of our colleagues among those who have contributed to our knowledge of the effects of noise on the ear and in the development of noise control. These men have worked individually as well as through our local and national societies. A number of them are or have been members of the Chicago Laryngological and Otological Society, which organization I have the privilege of representing today.

Because much of what they have done has been incorporated in the Occupational Safety Act, Walsh-Healey, et cetera and is covered in the statement of Dr. Meyer Fox, we will discuss certain circumstances of noise exposure sometimes inadequately presented or incompletely understood. This is the problem of ear-damaging noise among children, the isolated or self-employed industrial worker, those engaging in domestic or recreational activities, and all persons subjected to change, inadvertent, mischievious or malicious exposure. Our information is based wherever possible on experimental clinical or deductive grounds. Some of it is speculative and is so stated.

The word deafness is a general term for hearing loss, of which there may be all gradations, from very slight to profound or complete; also the extent of the hearing loss determines our capacity to function comfortably in all human activities. Hearing is the entry to the soul, but, unfortunately, loss of hearing is the least recognizable, and, therefore, the least urgent of all human ills, so that most of us overlook it, mistake it, or deny it, making it exceedingly difficult to identify, prevent, and treat.

Our testimony today will discuss the effect of noise on the ear in children in three age groups and adults in two age groups. The types of noise producers concerned are shown in the attachment. Not all noises are listed but rather are used as more common examples either of definitely proved, highly suspect, or possibly suspect of ear-damaging potential. We are concerned with any kind of hearing loss or ear symptom, from very mild single tone dips, to symptoms of pain, ringing or sounds in the ear (tinnitus) or vertigo, inasmuch as the inner ear consists of both the auditory and vestibular apparatus. The very mild sensory-neural hearing losses usually do not interfere seriously with everyday function but can be somewhat incapacitating in a background of masking noise.

I. Children

A. 0–5 years (17 million in this age group).—A total of 5 percent of these children (850,000) are estimated to have a hearing loss, most of which is congenital or occurs in the first few years of infancy as the result of local or systemic diseases. Some of these losses are moderately severe or profound. The mild or moderate sensory-neural losses are difficult to ascertain, but to protect these children from any possible source of damage, certain types of noise exposure, such as frequent and prolonged positioning on the back ledge of the rear seat over the rear engine automobiles should be avoided, and, if there are older children in the house, protection should be afforded from the noises of cap guns and cap pistols. When accompanying mother around the house, try to keep the baby away from the obvious noisemakers, such as disposals, blenders, mixers, and garden and landscape tools, although the newborn and infant babies have some built-in protection with ear canals partially or completely closed and their middle ears incompletely ventilated.

B. Age 5–10 years (20 million in this age group).—At the present time 5 to 7 percent, 1 million to 1,400,000, are considered to have hearing loss, perhaps 20 percent of these are sensory-neural. The most common cause of permanent sensory-neural hearing loss, usually mild or moderate, but permanent, in one or both ears is exposure to the high-intensity sound of cap guns or cap pistols or explosion of whole rolls of "caps." The whole roll explosion is usually accomplished (as most of us former boys remember) by hitting the roll with a hammer or baseball bat, and frequently is done in a confined space, such as a cellar or garage, or between walls as in an alleyway or sidewalk between buildings. Many of the children are onlookers, not knowing what to expect, and have not had time to avert the head or cover the ears. Also the game of "cops and robbers" or "war" use such devices and the shot can be made close to an ear by running up from behind.

In this age group and in some of the younger children, various types of "noise" making toys are available, many very likely harmless, but some possibly of ear damaging intensity, such as the "paper" explosives, and these along with explosions of paper bags, balloons, and other devices, particularly in a closed space, such as in our airtight automobiles, could be potentially damaging to an ear or ears, depending on the various factors involved. There are new toys introduced from time to time with ear-damaging capacity.

C. Age 10–18 (32,500,000 in this age group).—Perhaps 2 to 3 percent with hearing loss, 650,000 to 975,000, most of these sensory-neural, many of which were incurred at an earlier age. In addition to the previously mentioned exposures, these children at camps and school may become involved in rifle and pistol instruction. Frequently they accompany fathers or other members of the family on hunting expeditions or to target practice, including skeet shooting. Most, if not all, of this exposure occurs without adequate ear protection. Chance and inadvertent exposure to firearms could occur when near a starter's pistol on swimming or track teams.

These children encounter other possibly damaging noises when they build and fly model airplanes, are enrolled in workshops with high speed tools at school, or have them at home. During this age period children could be exposed to gocarts, minibikes, snowmobiles, motorcycles, and perhaps some of the older children may even be involved in construction projects, engine construction, car mechanics, etc. They are also introduced to rock and roll music at high amplification considered by some authorities to be ear-damaging.

II. Adults

A. Age 18–65 (113 million in this age group).—Estimated 2 percent hearing loss, 2,260,000, mostly sensory-neural. Large numbers of this age group are isolated workers in large or small industrial activities and hundreds of thousands are self-employed. They work with jack hammers, chain saws, and noise making equipment of all kinds, including shoe repair machinery, floor graders, sanders, et cetera to cite only a few examples. Some may be part of an industrial hearing conservation program, but most of the self-employed would have no access to preemployment or followup hearing testing.

Of possible concern in this age group would be exposure to noise in computer rooms, or from walkie-talkies, civilian band intercommunication devices in planes, trucks, cabs, hospitals, transistor radios worn constantly in the ears, et cetera.

B. Over 65 (20 million people in this group).—An estimated 20 percent of this group have a hearing loss, possibly the single most common disorder of older age. Of the 4,000,000 hard-of-hearing older people, perhaps 10–15 percent, 400,000 to 600,000, could be directly attributable to noise exposure sometime earlier in their lives. This loss generally is accentuated by advancing age, as well as other diseases of age. The sad commentary is that these losses are preventable but not treatable.

Except for chance or inadvertent exposure to firearms or blasts, damaging noise in this age group is limited, but many of these people wear hearing aids and chance exposure can be a problem. Certainly the masking effect of noise on speech intelligibility is a great obstacle to the successful use of hearing aids.

General Considerations

All age groups can suffer permanent, frequently severe, inner ear damage from chance or inadvertent exposure to firearms or blasts. A number of persons have been in the vicinity when a firecracker, a cherry bomb, or other explosive is detonated mischievously or maliciously.

There is a special problem for persons of all ages who wear hearing aids when exposed to such very loud sounds. There are some instances of progressive hearing loss in children wearing hearing aids as a result of such exposure. One explosive may be sufficient to damage the remaining hearing almost entirely. It is recommended that all persons wearing hearing aids turn their aids off, whenever such an exposure can be anticipated.

Recommendations

The physician in private practice can be of enormous help. Starting in his own office or home, he can insure any equipment he uses is noise-treated. He should counsel all of his patients who have had chronic otitis media or middle ear surgery, where natural defenses of the ear may have been altered, to avoid or protect themselves from damaging noise. All patients seen by him should have a work, household, and recreational history, and in instances of known exposure, proper precautions should be advised, including earplugs or muffs. He should urge and provide regular hearing tests at least once a year, for all ages from shortly after birth and thereafter.

The physician should encourage and participate in hearing conservation programs in industry and should support medical society presentations and symposia on the subject, help in organization of special medical committees in local, State, national, and specialty societies, where necessary. In Chicago and in Illinois we now have such functioning committees, both of which are active in legislative matters.

As far as legislation is concerned, the physician should advise no more than is necessary and enforceable, and none unless it includes active medical consultation, participation, and supervision. Specific legislation, if not already available, should include severe punishment for the mischievous or malicious person who causes damage or destruction of hearing with firearms, firecrackers, explosives, or other device.

Strict regulation of all firearm training courses and ranges, outdoor and indoor, is absolutely required for all ages, and all schools, camps, and other organizations should be advised that adequate ear protection is mandatory at all times for the participants and the onlookers. Further studies of school workshops should be done similar to industrial noise areas. All self-employed workers around noisy equipment should be advised of the possible hazard to the ears and regular testing of ears and control of machinery be affected.

Other legislation could require testing of all toys, medical or other devices prior to marketing similar to methods used for medications through HEW. Perhaps we may be able to get accurate measurements of impulsive noise and then put warning labels on the toys and other equipment: "May Be Injurious to Ears and Hearing." However, don't take the fun out of some of these toys.

The physician should encourage the development of a program to provide public information on the prevention of deafness of all kinds, particularly that due to ear-damaging noise.

ATTACHMENT

I. Explosive

A. Industrial and military.—Dynamite, power nails, backfires.

B. Domestic, recreational, and entertainment, including toys.—Caps, cap guns, cap pistols, paper-pop guns, other toys. Firecracker, starting devices for sports (track and field, swimming, sailing, and so forth) including guns, carbide cannons, and so forth, theatre in the round, baseball score boards, skeet, hunting, target practice, gun galleries.

C. Miscellaneous.—Tree rooting, animal holes and nests, etc.

II. Machinery, Motor, and Functional, Including Abrasives, Shippers, etc.

A. Industrial and military.—Garage equipment and automobile noise, power tools including chain and buzz saws, ship holds, truckers' cabs (engine, wheel and road noise), bulldozers, garbage trucks, lifters, computer rooms, secretarial and statistical machines, business machines.

B. Domestic, recreational, and entertainment, including toys.—Home workshops, garden and landscape equipment, kitchen and basement appliances, air conditioners, floor sanders, private airplanes, snowmobiles, power boats (water skiers), campers, outdoor amusement parks (motor-driven ferris wheels, roller coasters, tilt-a-whirl, and so forth), model railroads, model airplanes, go carts.

C. Miscellaneous.—Medical equipment, dental drills, burglar alarms and security devices, radio and TV tones, transistor radios (in the ear), walkie-talkies, civilian band radios in planes, cars, and so forth, gerbil wheels.

III. Blowers, Nozzles, Air Pressure Devices, and Wind Exposure

A. Industrial and military.—Ice- and snow-making machines; snow blowers; exhaust, ventilating fans, and blowers; air rifles; tubes and hoses; tire inflaters and deflaters.

B. Domestic, recreational, and entertainment, including toys.—Snow blowers, top-down drivers' sportscar, open cockpit planes, whistles.

C. Miscellaneous.—Warning devices, sirens (police, ambulance, firecall out volunteer firemen), air-raid, celebrations, power whistles, traffic whistles.

IV. Percussion and Vibration

A. Industrial and military.—Piledrivers.

B. Domestic, recreational, and entertainment, including toys.—Rock-and-roll, home amplifiers.

Dr. **MEYER.** Panel?

Dr. **WHITCOMB.** Because of the magnitude of the problem you have outlined, would you consider that it might be reasonable to augment the private practitioner with an inexpensive public clinic of some kind where monitoring could be done on children, for example?

Dr. **MARCUS.** That is a possibility, yes.

Dr. **WHITCOMB.** There really aren't enough of otolaryngologists as a group to do this sort of job, I don't think.

Dr. **MARCUS.** I think that is a very good look at a major problem in terms of the numbers involved, and on some occasions I have considered the possibility that some of the otolaryngologists' offices could be expanded with the cooperation of the public people to do this sort of thing—in other words, bring some of the so-called public monitoring stations, as you referred to them, near or close to, or actually in the otolaryngologist's office. He will be there; it will be much easier than to do it—obviously there would be problems of administration and so on, but no more so, very likely, than any other way.

Dr. **WHITCOMB.** There might be—this could be ideal because then the rough screening might identify somebody early who could then be examined more thoroughly.

Dr. **MARCUS.** Absolutely. I would be very much in favor of such a thing.

Professor **PLAGER.** You left out of your catelog, Dr. Marcus, of noise sources, screaming parents as potential damaging sources, but to pass that for the moment, you call for several kinds of legislation, reaching the question of evaluation and perhaps restricting the use or sale of various kinds of possible noise hazardous items. To your knowledge are there any governmental programs, either state or Federal, or perhaps even local, now in effect that are dealing with this problem?

Dr. MARCUS. I was hoping to have an opportunity to check this out. I have not had such an opportunity. I don't know the answer to that question. I think it's important to find out as soon as we can what the statutes are in regard to the problem that I mentioned.

Professor PLAGER. Thank you.

Dr. MEYER. Your colleague, Dr. Whitcomb, is getting edgy.

Dr. WHITCOMB. Actually I have—FDA has initiated a start in this direction with, first of all, banning caps, which you mentioned earlier, and then second, when there was some reverse scientific reaction to that, because the pulse is so short in duration, compared to shotgun shells and so on, which are more hazardous, I think they have now adopted the posture of simply labeling these containers as hazardous.

Dr. MARCUS. I hope that will be enough.

Mr. HINTON. Dr. Marcus, this panel—at least several members of this panel, particularly are interested in the transportation noise sources and their effect on the spectator or the user. You mentioned just briefly the automobile, of the child riding in the automobile. My experience has been continuous, with more and more people traveling, more children, of course, being carried along——

Dr. MARCUS. Right.

Mr. HINTON. There are a lot of sources of noise, for example, aerodynamic noise, which is almost continuous in a moving vehicle; that is the principal source of noise in an aircraft, by the way, in the cabin——

Dr. MARCUS. Yes.

Mr. HINTON. So what can be done, in your estimation, and would you have any suggestions that this panel might consider about this problem?

Dr. MARCUS. Well, it is not clear to me, of course, how damaging to the ear such aerodynamic noise could be, so I would think the first thing that could be done is actually set up an experiment whereby, with volunteers, check and see what the hearing would be after a ride of 1 hour, 2 hours, 3 hours, whatever it would be, and see if there is a temporary threshold shift of hearing; follow it up over a period of time, and see if, in fact, there may be some difficulty.

The second aspect of that, however, is that again, talking about the patients who wear hearing aids, with this noise, which is a low sort of a hum, you can describe it as a distant roar almost, it does interfere with hearing. You can't hear as well, and when you are wearing a hearing aid, all these sounds are a major problem, and wherever they can be reduced, let's say, from the point of view, with interference with a speech intelligence, that should be done. I think further studies are certainly called for as far as ear-damaging effect.

Mr. **Martin**. Dr. Marcus, my question is twofold; one, what kind of levels, in general, create this hearing damage, and second, what kind of exposure, continuous or intermittent, what length exposure generally would cause a permanent threshold shift?

Dr. **Marcus**. In my opinion, a—let's say there are different levels of sound from the different explosive devices—the caps would have a different one than a shotgun, for instance; a rifle of a certain caliber from another.

In general, I would say until we get full information at what kind is being used at what point, we can consider that the explosion at the muzzle of most of these that can cause trouble runs anywhere from 130 to 180 decibels, at least, and in some may reach peaks if we could measure these, over 200. Now, this occurs in a very short space of time; nevertheless, the experience that I have had so far indicates that one such exposure, if the head is just held—if the conditions of resonation and reflexion are just right, can result in a permanent loss of greater or lesser degree.

Let me illustrate that particular one. They have the so-called blank cartridge that is used on the stage, and one of my patients attending a theatre in the round here in the Chicago area, sitting on the aisle, her left ear at the aisle, one of the actors came running down. He was supposed to carryout a shooting gesture with one of these pistols, and happened to shoot it right above her head, within a few inches of the left ear. She immediately had roaring; she had some vertigo in the ear; she noticed she couldn't hear well. She came in the next day. Fortunately I had had previous tests on her, perfectly normal hearing, some months before; she had practically no hearing in that left ear. This is what I call the chance or inadvertent exposure to this type of thing, and indicates to you how serious one explosion can be.

Now, then, if we consider that other children may not be quite that close, other people not quite that close, they may have mild tonal dips, let's say a dip in the hearing which is permanent, but not necessarily of a character which would interfere with their everyday activities, but still can be added to through the years, so this is a major problem. The noise that comes from these guns, from these explosive devices is tremendous, and is damaging.

You asked another question, and I, in my long answer to the first one, I am sorry, it had slipped my mind. I am going to ask you to repeat it, please.

Mr. **Martin**. Well, I am mostly concerned about the intermittent, or somewhat, an hour of continuous exposure to things like blenders, appliances in the home, which are not quite the 130 level.

Dr. **Marcus**. Right. Yes. This is not known, and I am uncertain as to how much exposure, let's say, would be required, whether the intermittent exposure that we know of in the kitchens, for, let's say, minutes or short periods of time, would be damaging. We all know that this should be considered accumulative sort of type—in other words, you have to take the amount per day or per week, or let's say the lifetime of exposure in a situation like this, and I have listed these as potentially ear damaging the capacity. I do not say that they would be definitely so.

Professor **KERREBROCK.** I think I can answer my own question from your last answer, but I want to ask it anyway, for the record. Do you know of any evidence of ear damage due to transportation-derived noises in the general populace? That is, is there any damage to the ear from aircraft noise, from truck noise and so forth?

Dr. **MARCUS.** You see, this is one of our problems, to be able to have some base from which we can, from which we can measure changes in hearing. Fortunately today most of the schoolchildren have hearing tests, so that we know what their hearing is or had been at a certain time.

For us, then, to go back and measure what the noises have been, and whether a hearing loss that we now see in an older child is related to such transportation noise, becomes a very difficult situation. This is one of our—one of the drawbacks to the problem as we see it today.

We do not yet have enough information on day-to-day hearing of children and adults, to measure what something like this could do to the hearing.

Professor **KERREBROCK.** Thank you.

Dr. **MEYER.** Dr. Marcus, before we ask for our next witness, my colleague, Mr. Hinton, has one further question he would like to ask you——

Dr. **MARCUS.** Oh, yes.

Dr. **MEYER.** And we have asked you a lot of questions, because, really, your testimony is central to the problem of noise, in addition to the nuisance effects of course. We appreciate your time, and before we excuse you, may I allow my colleague to ask you another question?

Dr. **MARCUS.** Yes.

Mr. **HINTON.** Dr. Marcus, I would like to have your brief opinion on whether or not you think that transitory flyover noise, for example, of an aircraft, or vehicle passing on our highways of a high magnitude, but very short duration, has any permanent threshold shift effect on hearing?

Dr. **MARCUS.** I have no specific information to that effect, but I have had the testimony from patients who, in the days before with air conditioning in cars, now, whether this introduces some other problem or not as far as ear-damaging noises concerned in regard to your question about aerodynamic noise, but in the days before air conditioning, salesmen used to drive for hours and hours many days of the week with the window open, and some would say to me, after a day's drive, they felt they did not hear as well out of that side, and they would come in some years later with a loss on the left more than the right—more so, let's say, they felt in their own minds it was related to that type of exposure. I think this is a very important aspect that has not been carefully studied, and should be studied.

Mr. **HINTON.** Well, I wasn't referring to that aerodynamic noise this time; I was referring to the high noise level of an aircraft passing at low altitude, or a truck on the highway passing by, close by the observer, where you have just a few seconds—5, 4, 3 seconds of peak noise, and then you have a period of relative quiet. You know what I mean?

Dr. **Marcus.** Yes, I understand what you mean.

I doubt—I doubt at the moment, unless we are dealing with other physiological factors in the ears, or pathological factors, let's say a patient who has had ear surgery, as I mentioned before, if the natural defenses of the ears may have been altered, I think it's possible some of these people could suffer some ear damage from the kind of exposure that you refer to under other circumstances; it would seem to me somewhat unlikely that this would have any permanent effect.

Mr. **Hinton.** This was my information also. I just wanted to have your opinion.

Dr. **Marcus.** Yes.

Dr. **Meyer.** Thank you very much, sir, for a most helpful presentation.

Dr. **Marcus.** Thank you, Dr. Meyer.

Dr. **Meyer.** We have a group of individuals, a representative group of individuals, who have taken some time to come here from out of State to give some comments on noise as it affects people engaged in noisy trades. We have heard from Dr. Marcus.

It's a well-established fact that the greatest exposures of the American public to noise-risk deafness are in the occupational groups working with heavy machinery; people who are working around testing of aircraft engines, people who are working in steel mills, people who are working around lumbering operations, with big saws and so on, so I would like to ask AFL–CIO representative, Mr. Sheldon Samuels and his colleagues if they would come forward.

Mr. **Samuels.** Thank you. This is Mr. Noah Roberts, chief steward of the Whirlpool plant in Benton Harbor, and Mr. Al Romeo, president of the local there, the International Association of Machinists.

Dr. **Meyer.** Very happy to have you gentlemen. Thank you, Sheldon, for arranging for their arrival here, and, gentlemen, we would like to hear from you.

STATEMENT OF NOAH ROBERTS. AND AL ROMEO, JR., MACHINISTS UNION

Mr. **Roberts.** I am Noah Roberts, chief steward, local No. 1918, Machinists Union in Benton Harbor, Mich., representing the Whirlpool workers of the St. Joe division.

Mr. **Romeo.** Albert Romeo, Jr., president of local No. 1918, Machinists Union, representative for the people of St. Joseph, Mich.

Dr. **Meyer.** Please proceed, gentlemen.

Mr. **Romeo.** I am having Mr. Roberts here start.

Dr. **Meyer.** Very good. Would you mind moving the microphone, that black one, just a little closer to you?

Mr. **Romeo.** I have a hearing problem, so you will have to speak up.

Mr. **Roberts.** To begin with, I would like to present here some layouts of the plant, and the one here is marked off with some readings, I would like these to be entered into your records.

Dr. **Meyer.** It will be done, sir.*

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* This material is on file at the Office of Noise Abatement and Control.

Mr. **Roberts.** I have several copies here; how many copies would you wish? That is a layout, identified by plant number of the entire St. Joe division, and where the readings are posted there, represents the first area in which the—which is affected by this new act concerning the health and safety, and the ear muffs were put into effect in this area prior to any attempt on the part of the company, to reduce the noise.

Our local union is totally unsatisfied with the progress, or with the manner in which the company has approached this problem, and we are of the contention that the company is, has taken the cheap way, and the easy way out, and is not actually presenting a solution to the problem that we have.

The—I was given permission to take some readings in the plant, and these readings were taken, and these represent the readings that appear on this sheet here [indicating].

The readings read as follows:

In one area I got a reading, reading from 95 to 97 decibels.

And another area I got a reading of 102 decibels, and 95 to 106 decibels.

And in another area, 98 to 100, and 98 to 102, and 93 to 94, 102 to 104, and 93.

Now, I had one area there that read about 88 to 94 decibels, and the way that the company has measured this noise, they have an exposure meter that they have attached to the employees, and have them wear them for a period of eight hours, and in the areas that shows 180 minutes of 90 decibels or above. Those are the areas that are affected, and the people are required to wear an ear muff.

Now, these—they have made no attempt whatsoever to lower the sound level in these high noise level areas, with the exception of one plant, which is a machining operation, and that is numbered as plant 7 on the diagram, and has no readings on it. That will be up in your righthand corner of the diagram up there, as plant 7, and they have made some minor changes there based on some suggestions that the people, the employees themselves, have turned in.

I think it was November the 25th when the company first approached us on this problem, based on the congressional acts, that were about to make this a law, which would affect them, and only then did they become real concerned about it, and they informed us that there would be a hearing abatement program put into effect as a condition of employment, and all people working in the high noise level areas would be required to wear an ear muff, and we were not given a choice as to the type of protective equipment to wear.

They said this is what you will wear; any other type of equipment will not be accepted, and we don't feel that this was the proper approach to this.

We acknowledge that we have a problem with noise, as most of the industries do, and we definitely feel that there is something that can be done to lower this noise level, in many cases, below the danger level—and in most cases down to the level by where certain types of protective equipment would bring it on down to the safe level.

This company has failed to do anything in the press room area that is diagramed there, and their answer to it was that it was senseless to spend hundreds of thousands of dollars and not be able to move the level of sound down over one or two decibels.

They feel that there is nothing that can be done to quiet punch press type noise, and certainly we don't agree with this.

We feel at least this company should make an attempt to fulfill their obligations in accordance with the act and exhaust every means of engineering control to reduce this sound level.

Also, we feel that the proper protective equipment should be issued, and the equipment should be the type that would not in itself present a hazard.

The types of machines that several of the people have to run there, they run them by ear; if you block the sound off, then that becomes a hazard in other manners, causing a person to be subjected to loss of arm, or possibly loss of life.

Also, on lift truck operations, mechanical motorized vehicles, in many instances we have to depend on sharp hearing to properly perform our duties on these lift truck jobs, and if our hearing is deterred in any manner, well, it increases the hazards on our vehicle jobs, and this is one of the reason why we appear here, and we haven't had any—we have asked that the inspectors be brought in to offer some suggestions as to the solutions to this noise, and up to this point they have brought no inspectors in.

We haven't—this has been a company program; it's been made a part of the shop rules. It's been made a condition of employment, and the company—the only manner in which they have dealt with this union on this was that, I think, about November the 25th they approached us, informed us of what they intended to do.

They came back in April, I believe—and I don't remember the date—they informed us then that they had had their engineers to offer several suggestions, and there seemed to be no solution to the problems in the area that we are most concerned about.

And then again on June the 2d—June the 3d, I believe it was, they interrupted a committee meeting that we were having and told us at that time that the hearing abatement program would be put into effect on the startup date following vacation, which was July the 12th, and we now have a compulsory, mandatory ear muff program, and this we don't feel is the, has been done in a proper manner.

We don't feel that the company has discharged their full responsibility to this, and that the wrong avenue of approach was taken to the problem, and we would very much like some help from the inspectors from the Federal Government to assist us in getting a safe program in this plant to help abate this noise.

Dr. **Meyer.** Thank you very much for this presentation, sir. I will see to it that the information you have given us is transmitted to the people in the Department of Labor, who are concerned with the enforcement of the Occupational Safety and Health Act. The reason the company has, as I am sure you have already indicated in your testimony, required you to take these measures is that if they don't either quiet the equipment or provide you with required hearing protection they become a violator of a Federal law for which there are very strict penalties. So the fact remains, though, that you have a problem that should be brought to the proper people's attention.

I would like to ask the panel, if they have any questions before I ask several.

Mr. Martin. Does the company medical department have any kind of hearing equipment that they can measure employees' hearing before and after exposure, and do they have any plans that they have told you about to modify exposure times based on possible hearing loss that occurs to employees in this area?

Mr. Roberts. They have a soundproof room that was recently installed to test a person's hearing prior to going into these high level noise—these high noise level areas, and I am not sure yet whether they have put this into effect on a plantwide basis or not.

There is one thing about this program that we are not satisfied with, taking myself, for an example, I requested a hearing test, and after the test was taken—and it was taken by the first aid nurses who I am not convinced are totally qualified to take this test; then I requested a copy of my medical records of this test for my medical records, so that I could have it for future reference in case of a problem, because we know nothing about the reading of this test, so they could come up 2 or 3 years from now with any type of a reading.

They have indicated that this test will be given periodically, and they gave semiannual and annual as their concept of periodically, and I understand that there are possibilities that a law may be passed making these records available to the employees.

At the present time they have refused—they have denied my request for a copy of my hearing test, and this is also what I would like to get resolved in the future, very near future.

Dr. Meyer. At last——

Mr. Romeo. I would like to add to that.

Dr. Meyer. Go ahead, sir, please.

Mr. Romeo. They are going to make it a mandatory thing that everybody in the plant take the hearing test.

Dr. Meyer. Well, the last point that your colleague has given is an important one, and I certainly shall see to it that it gets to the proper people in the Department of Health, Education, and Welfare, and Labor. Certainly, the results of that sort of a hearing examination ought to be furnished the employee; medical records, as Dr. Marcus would tell you, are considered sometimes to be professionally confidential for a variety of reasons, but it's just like a prescription for your glasses. Why, certainly something of this nature, some system, should be worked out. I will see to it that the people responsible for the law that you are discussing here get this information This law is not this Agency's responsibility but it is one that we are concerned with.

I have several questions I would like to ask you, because it is on the total noise problem—not only the noise within the plant, but the noise outside the plant.

What type of construction is this building that you took these measurements in?

Mr. Roberts. This is a steel-type, metal-type construction. I think parts of it are made of brick or blocks of some type.

This plant was started back in 1947, I believe, and it was continuously added onto, and at each time that the plant was added onto, a new type of material—there was a new type of material used in each addition, or a more up-to-date type of material, so it's of a steel-type construction plant, and there is no exhaust in the ceilings, and no ventilation from the ceilings at all, and we have offered this as a means of suggestion.

Now, the plant 5 area here that is in question is relatively new. It came into existence in the sixties, the early sixties, and by our millwrights and maintenance department, it was suggested at that time that all this machinery be exhausted in the pit, in the floor, you know, and this wasn't followed because of the expense involved in it.

Now, the perimeter reading of this department here averages about 95 decibels, and I had an engineer, one that was supposed to have been one of their sound experts that has been schooled in this from the company present with me when these readings were taken, and he acknowledged the accuracy of it, because he was giving me the readings to the areas, in many cases, before we would ever get to these areas. He would tell me that a certain reading would be here, in this area, and when we got there, we would find that reading to be correct.

Dr. Meyer. I gather this is a punch press operation?

Mr. Roberts. Right.

Dr. Meyer. When was this equipment installed, and how long did it take to install it?

Mr. Roberts. This equipment was installed, I believe it was finished up either in 1961 or 1962. Now, there has been additions to this periodically, new equipment being brought in, larger presses, 4 to 800-ton type of presses, etc., and we have automatic lines with eight or 10 presses tied in in sequence to perform top-type operations, to start a top of a washing machine and totally finish it before it's released at the tail end of the operation, and these presses have been continuously updated to high speed type presses over the years, and the latest press just came in this year.

Dr. Meyer. Thank you very much. We appreciate receiving this information, and it will be in the record, and I will take the necessary action to see that this information gets passed on to the right people. Thank you very much, gentlemen; I am glad you could come, and appreciate your taking the time.

Mr. Roberts. Thank you.

Mr. Romeo. Thank you.

Dr. Meyer. The next person I would like to call is Dr. Alfred Etter, a Naturalist with the Morton Arboretum. Dr. Etter.

Dr. Etter. I thank you, Mr. Chairman. I have copies of my presentation here, if anybody would like to have copies.

STATEMENT OF ALFRED ETTER, MORTON ARBORETUM

Dr. Etter. I speak for a little black girl who recently visited the Morton Arboretum where I am the naturalist. On the floor of a woods she discovered a small piece of a tree. Unable to recognize wood that had never been sawed or nailed she asked what it was. When she learned that it was a piece of a genuine tree, just the way God made it, she was so delighted that she embraced it like a doll and carried it home to the ghetto with her on the bus. That is how ignorant of nature our people, especially our children, have become. For many of them, the unnatural has become the usual—so it has been with noise.

I think I speak not only for this little girl, but for people of every age who, because of rising levels of noise everywhere, are searching for something they feel they have lost. Without knowing it, they need to walk and sit together in a quiet place and look at the earth, listen to how the birds sing, and perhaps to puzzle about how much growing, and developing, plants can accomplish without ever making a sound.

When I requested permission to testify at this hearing, I was asked whether I wanted to testify as an expert. How does one qualify as an expert in these matters? Must he have a Ph.D. to speak out against the inhumanity of man's noise? Isn't just being alive enough? Aren't ears sophisticated enough to tell the difference between what is strident and what is soothing? Aren't irritation and anger as good a measure as decibels?

If it helps impress someone, then yes—I have a Ph.D. I have spent 8 years in college and the rest of my life in studying the earth, and the life of it. I have made it my responsibility to understand how the world is put together—and not a little of this understanding has come from listening to the sounds of nature—the silent sounds of stars, the timeless flowing of rivers, the enthusiasm of wrens, the gnawing of squirrels as they husk walnuts in the fall.

In the past 15 years of my life, I have traveled among the largest cities in the Nation, and so I have become somewhat expert not only on sounds but on noise. I have heard most of the sounds of nature obliterated from the lives of people—worse than that, the sound of the people has been obliterated too.

Now that I am living at the Morton Arboretum in Lisle, I am receiving an involuntary post-doctorate in suburban noise. Though people have a vision of the Arboretum as a nice quiet green island somehow immune to progress, that vision is false. Hemmed in by ever-mounting traffic of every sort, it is already a victim of the noise that people and industry bring with them when they are fleeing the inhumane conditions they themselves had created in the deeper city.

A short time ago we had a ceremony on the grounds of the Aboretum at which Senator Adlai Stevenson spoke. Many of those in the audience were disappointed that they were unable to hear him because of the traffic on Highway No. 53 where trucks, attempting to satisfy the insatiable demand of people for a new environment, pace back and forth like caged tigers.

I live on the Arboretum and my bedroom window faces south overlooking the East-West Tollway about 1,000 feet away. The Burlington Railroad is nearly a mile further south. Jets often fly by only a few thousand feet overhead. I have no choice in summer but to leave the window open, and all night I toss and turn and have my own violent thoughts about how I can outwit the vibrations that shake not only the sky but the earth even from those distances.

I wonder how many others toss and turn, and grow angry along with me. Yet I am far more fortunate than most. What tortures of noise are inflicted upon those who are trapped in the breathless city forced to open their windows to the excretions of industry, the hot exhaust of vehicles, and the exhalations of countless office and apartment air conditioners that heat rather than cool the environment? Is it any wonder these people revolt, burn, vandalize, seek refuge on Government property by the lake, as Mike Chosa and his Indian followers tried to do? The Indians still have enough instinct left to recognize the kind of environment a human being needs—what kills and what lifts the spirit.

At the Arboretum on field trips I often try to tell children's groups how we should take care of the earth. What hypocrisy! My words and their questions are drowned out by banging vehicles and rasping tires. The sounds of frogs or birds or squirrels might as well not even be. Not long ago there was national concern about a silent spring. We have solved that threat with a greater one. Who knows whether the spring is silent or not amid the pandemonium of modern vehicles?

Not long ago I spent a morning at the Ogden Avenue School in La Grange with a group of young people, trying to show them what there was of nature left on their own schoolyard. Amid the acceleration and deceleration of trucks and jet noise overhead, I could hardly make myself heard when I tried to communicate some of my excitement at finding a honey bee nest in an old maple tree on the school grounds.

For the sake of economy, several school buildings in the Chicago area are now being used 12 months of the year. Have you ever tried to teach, or learn, in a hot school with all the windows open and the noise of the traffic and road repairs boiling up from the streets? What is gained by wasting pupils' and teachers' time trying to fight the domination of today's traffic? How many of the other so-called fruits of civilization, the art museums, the peaceful parks, the opportunities for visits and strolls in the neighborhood have succumbed to the omnipresence of noise?

On a farm where I lived and did research, it was an everyday observation that vibrations of every frequency were constantly being exchanged between animals, men, and the earth—but this communication was only possible when everything was quiet. Life is absolutely dependent on quietness. Animals and birds depend upon it to make their living, to find their mates, to protect themselves from attack. Embryos still in the egg communicate with their siblings in adjacent eggs and so synchronize their hatching. Have you ever watched a robin lean down to listen for a worm? What happens to the radar of the bats, the trilling of toads, the prolonged symphonies of the thrushes when their home ranges are invaded by raucous man-made racket? For the most part, they give up.

Last fall I watched a string of sandhill cranes wending their way southward over their ancestral route, suburban Chicago, once a land of marshes and lakes and clean streams, now become a checkerboard of streets blanketed with polluted haze threaded with the webs of jets, helicopters, and small planes. How much longer will the wild cries of the adults keep the young of the flock on course until they find a sanctuary?

When animals are made to listen to noise, they grow sullen, unresponsive, erratic, or violent. Is it any wonder we have violent, despondent, indifferent people when they cannot hear, in their neighborhood, the once familiar events by which they timed their day, conjured up visions of friends passing by, of tradesmen plying their routes, of church service, or children at recess? People need sounds to stimulate the joys of expectation, to reassure them that they are part of a system, a pattern, or to challenge them to be alert and observant—and to hear sounds, they need quiet.

It was James Russell Lowell who said ". . . heaven tries earth if it be in tune . . ." Who can tell, amid the cacophony of today, whether the earth be in tune or not? I suspect that dissonant worlds have a way of producing dissident people. Three years ago I was in Washington, D.C., and participated in the so-called "Poverty March" on "Solidarity Day." It was a memorable experience. I found a lot of people sharing a lot of unhappiness, peacefully. We were not complaining just of poverty, hunger, discrimination, or bossism. Among us was a down-deep resentment for the kind of world that was being forced upon us. Few could epitomize their feelings—there was only a kind of vague malevolence threatening us, bringing us together.

As we stood there, several hundred thousand of us, hoping to hear some wise speaker who might diagnose the problem, the malevolence suddenly revealed itself as it broke upon us from every direction as the careful, soulful, often beautiful, even crying words of the speakers received lash after lash of violent noise from descending jets, hovering helicopters, and flatulent buses. Reverend Abernathy's cries of "soul power" were impotent in the face of noise power, in the swish and boom and scream of propellers and exhausts and sirens. Prayers, hymns, anthems, and even the courageous voice of Coretta King were cut down with impunity.

Little wonder, I wrote in my notes, that the people of America are becoming violent, sullen, plotting and addicted—for they are being dominated by the technological impudence of machines.

Noise is the ultimate insult. It kills what is left of many things that we have loved—music, beauty, friendship, hope, and excitement—and the reassurance of nature. Traditionally noise is used to ridicule, embarass, denigrate, and curse—while silence is used for worship, respect, anticipation, and love. Do we hate each other as much as our noise level indicates?

Collapsing Rome didn't give a damn how much noise it made any more than we do. Read Juvenal—and weep with him:

> Insomnia causes more deaths amongst Roman invalids than any other factor * * * How much sleep, I ask you, can one get in lodgings here? Unbroken nights—and this is the root of the trouble, are a rich man's privilege. The wagons thundering past through those narrow twisting streets, the oaths of draymen caught in a traffic jam—these alone would suffice to jolt the doziest sea-cow of an Emperor into permanent wakefulness.

Will the noise of modern man jolt the doziest sea-cow of all, the American city where the sounds of Ancient Rome have been magnified a hundred fold? Unless it does, I see no future for man.

Whom do I blame? I blame no one. I blame everyone. I blame all the people, including myself, who have come to Chicago to find a place to live, a job to do, and in the process have destroyed nature and created a tumult of noise borne of their demands for every convenience and every novelty and every protection from exercise, from chance, from weather. We each demand too much. It is our demands that destroy us, that keep the trucks roaring and the jets rocketing and giantism proliferating.

So, like the little ghetto girl who had seen nothing but boards all her life, we have become so used to living in this noise-torn world that we accept the dissonant and the sonorous as part of our environment. We no longer recognize quietness, nor know how to use it. But while I am aware that some can adapt to noise, as to other irritants, no adaptation is achieved without sacrifice. I think that if people ever rediscover quietness again, they will embrace it, like the little girl embraced her piece of tree, and treasure it as something that is not sawed and nailed and misshapen by man, but which contains within it some of the secrets of life and some of the explanation of why we are here.

I have appended to this list—well, short exerpts of articles from newspapers down through the years, just some, though. This is nothing new, this complaint about noise. Some of these go back to 1947, and so forth, so that I just thought those might be of interest to include in the record.

Dr. MEYER. They shall be included, sir.*

Dr. ETTER. And I have just a couple of minutes of recordings of what I wake up to, and we will have the dawn coming up like thunder out there on the arboretum.

[Demonstration of tape recording.]

That is the noise from the tollway, and a song sparrow trying to make himself heard.

[Demonstration of tape recording.]

This is a jet.

[Demonstration of tape recording.]

Well, I could go on with that. There is a solid tape here of 45 minutes of virtually the same thing, but I am sure you get the general impression.

Dr. MEYER. Dr. Etter, you are not only obviously a well-qualified life scientist, but you are a classic natural philosopher, and I appreciate your presentation. There is another philosopher, whose quotation I am about to read, who clearly agrees with you, and I think the audience would like to hear it, also, and I quote:

> I have long held the opinion that the amount of noise which anyone can bear undisturbed stands in inverse proportion to his mental capacity, and may therefore be regarded as a pretty fair measure of it. Noise is a torture to all intellectual people.

That is from "The World as Will and Idea," written in 1848 by Schopenhauer.

I certainly find your presentation most thought provoking. And I would also indicate that nature does abhor noise. One of your colleagues, whom you may know, Carl Krombine of the Smithsonian Institute, a very learned and eminent entomologist, reported in the Smithsonian magazine not long ago on a study he and his wife made on noise from locusts. They found that most other insects, squirrels and animals, birds and so on, will abandon an area in which the locusts are swarming, and some of the panel sitting here with me heard the other day in Washington a tape that was sent to me by a colleague in Dallas of a swarm of cicadas that had actually been measured at 95 decibels on the A-scale. Of course, they were observing the same phenomenon, in that virtually all the wildlife abandoned the area.

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* This material is on file at the Office of Noise Abatement and Control.

We appreciate your presentation very much. I shall see to it that a copy of it goes to those of us who are working on another panel dealing with physiological, psychological, and sociological effects of noise. Panel, any questions?

Professor Plager. I have one comment. Dr. Etter, the eloquence of your words was matched only by the impact of your demonstration there on the tape. You touch on a very significant problem which is of tremendous difficulty for any agency dealing with the noise problem.

There is a range of responses to the noise problem from physiological damage, and we heard Dr. Marcus on that, to those noises which fall in the area of annoyance, and perhaps psychological problems, to what I think you addressed yourself, and well, and that is the whole question of life style, the extent to which we are abandoning a historical life style without really appreciating the impact or the significance of it.

I simply note this for the record because it's a terribly difficult area in which to come to grips with what one does about the broad issue of life style, and you have very well called our attention to that. For that I thank you.

Dr. Etter. Thank you.

Dr. Meyer. Anybody else on the panel? Thank you very much, sir. Our next witness is John Harper, executive director, Environmental Parameters Research Organization.

Mr. Harper. Gentlemen, I am sure you will concur that Dr. Etter's presentation is a hard act to follow; however, I will attempt to do my best. I have a brief statement here, anticipating that this would be a crowded day.

Dr. Meyer. Thank you, sir.

STATEMENT OF JOHN D. HARPER, ENVIRONMENTAL PARAMETERS

Mr. Harper. Mr. Chairman, ladies, and gentlemen. My name is John D. Harper, I am executive director of a non-profit research organization known as EPRO. One of our current projects is the scientific research and evaluation of the propagation of sound waves over bodies of water, and the study of the effects of high energy sound waves on pelagic life and other marine biota in an effort to determine what, if any, deleterious results the siting of commercial airports adjacent to or in bodies of water does or will have on the aquatic environment. The results of this study are not expected for some time, so I will address myself briefly to two points that are pertinent to this hearing.

First, we all live in basically an anthropocentric society. Our first concern is usually, "What effect does this have on me? . . . How will I benefit? . . . How will this harm me?" This attitude should be questioned. We need to expand our horizons. Man does not live upon this planet alone. There are myriad other life forms that are just as dependent upon the fragile balance of a healthy environment as is man. And man's role is as a creature of nature, dependent upon other living creatures and organisms for survival. We must acknowledge that the technological society that we have spawned is depreciating by annoying and harmful noises the basic qualities of life, not only man's, but of other living creatures to which man's destiny is tied. There are those among us who defend, for whatever reasons I decline to speculate upon, the supposition that noise isn't really that bad, that it may be annoying on rare occasion, but that this is small price to pay for our great technological society, and that it is seldom, if ever with "proper" care taken, harmful.

A problem is said to exist when our view of what conditions are, does not coincide with our view of what they should be. Problems, in short, are products of our values. Which brings me to the second point I would like to convey. And that is education. The education of all members of our society, both young and old, to the knowledge that conservation of their hearing is just as important as the conservation of their sight and other senses. And again through education to appreciate the problem of debilitating noises and learn a consideration of others with an understanding of the necessity to preserve a more tranquil environment. This in itself would be a considerable undertaking as we have long been led to equate noise with power and status. The best truck engines are the noisiest, and the most powerful jet engines whine the loudest. A banging, clanging factory means fervid activity while a quiet plant conveys lethargy. These syllogisms must be changed.

I believe the two points raised here, the effect of noise on our total environment and the education of our society to the debilitating effects of noise, should share the highest priority of the many problems that face us. They are real and must be recognized and remedied if the degradation of our society is to be avoided.

Thank you.

Dr. MEYER. Thank you very much. Again I find something of extreme value, as in all of these comments we received during these hearings. I have yet to hear one that didn't have some meat for us.

I note your comments regarding the studies. One of the things that we would probably want to do is to contact you further, because Congress has asked us to find out who is doing what and where, and your views and comments here will be useful to us in our studies.

Mr. HARPER. Thank you.

Dr. MEYER. Panel?

Mr. HINTON. Mr. Harper, I am also very interested in this study concerning propagation of sound waves over bodies of water, and the effects of the aquatic life. I had no inkling that there was a potential problem in this sense, because our initial idea was that the location of airport operations at bodies of water would be an ideal situation from the standpoint of the people now affected.

Mr. HARPER. It may very well be for the people now, but for the aquatic environment, it could have a deleterious effect. Quite often the aspects of reefs, cause waves, underwater structures for spawning or habitats for pelagic life are held up as something favorable, or there are going to be fishermen out there; quite the converse could be true, with the impingement of high energy soundwaves with noise, the fish don't have any mortgages to pay. They could very well leave.

Mr. **Hinton**. That is very interesting, that you are looking into that. I am sure the EPA will be interested in the results.

Dr. **Meyer**. That's right. Panel, any questions?

Mr. **Harper**. Thank you.

Dr. **Meyer**. Thank you very much. The next person to appear to testify is Mr. Herbert G. Poertner, an engineering and research consultant. Mr. Poertner, if you are here, would you kindly come forward and let us hear from you, sir.

STATEMENT OF HERBERT G. POERTNER

Mr. **Poertner**. Gentlemen, my background is essentially that of civil engineering, public works engineering, and also environmental problems of our urban communities.

I intend to make a statement of my own personal views today, and the statement that I will make is, although not profound, I believe it does, in its philosophy, sound some fresh notes and focus some spotlights upon the approaches that people should and possibly will take to the solutions of some of our community problems.

The title of my presentation is, "The Pleasure of Living."

It's a wonderful, beautiful world—and it can be even more satisfying! Life is worth living—and the pleasure of living can be enhanced!

I am against noise—and I have been ever since I began to distinguish between sounds and noises. Community noise is only one of many problems causing frustration and unhappiness in our urban communities. But, I believe, there are other more severe urban problems—considering the community and its people as a unit. Some of these are: Human desolation resulting from our abandonment and disregard of the elderly; the misery of the money-poor who lack satisfactory facilities and care to provide for their health and welfare; and the gutting and desecration of our limited natural resources by those who place "income statement" in a hierarchy superior to "human welfare."

With full view of these mortal urban problems, I consider community noise to be a significant and serious environmental problem and I believe that it can be controlled to the satisfaction of most urban dwellers and workers. As with anything worthwhile, our attention, energies, and resources must be laid on the line if we expect to make noticeable improvements or if we hope to reverse the present trend toward noisier communities.

Community noise means different things to different people. What may appear to some to be an intrusion on the peace and tranquility of a neighborhood or local office complex may appear as highlights of community progress to others. Noise is often regarded by the business community as sure signs of community progress!

Too often community noise is regarded as a "thing" or "hardware" problem—when, in reality, it is both a "thing" and a "people" problem. Successful community solutions to community noise problems will be expedited if "human engineering" is allocated its due share of the financial and human resources that can be made available to dampen and erase noise from the areas of concentrated human habitation.

The "probability of success" of developing and implementing meaningful community noise control programs is most likely to be an exponential function of the means that are applied to: "Educate" people concerning the consequences of community noise—physical, psychological, economic, and social; "instruct" them regarding feasible solution; and "motivate" them to do that which can be done to reduce community noise. This is not an easy task, nor is it an impossible one!

Of these three requisites (education, instruction, and motivation), the latter (motivation), is probably the most difficult to achieve. The noisemakers and the noise-receivers must be motivated in tandem—to take actions, or amend actions, that will produce identifiable improvements in the "sound-quality" or "sound-levels" of a community, specific area or a point within a community. The motivation required in one area of a community may be entirely different from that required in another because what may constitute noise in one area may be unnoticed in another because of different sensitivities or different standards and life styles.

"Motivation" requires providing "incentives"! We could call these "incentives-to-quiet." They can be: Social, economic, political, psychological, physiological, ecological, or just "plain human"!

I doubt that very many of us wish to be engulfed in a sea of tranquility in our quest for quiet; however, the vision of "peaceful" surroundings is inviting and desired by most urban dwellers and workers.

If we are to succeed in abating and controlling community noise, we must develop well-conceived, planned and determined approaches, and programs. These will not evolve naturally nor will they become realities overnight. They will be given birth and growth through the processes of "education, instruction, and motivation" of the oppressed and "persuasion, legislation, and enforcement of law" in the conversion of the oppressors.

It is important to recognize that "persuasion" is much more effective and better received than methods that result in assessments of monetary penalties and sentencing to penal servitude. For this reason, it becomes necessary to identify and explain "incentives-to-quiet" to the noisemakers and the offended. We should impress upon our minds that people usually require substantial reasons for initiating and pursuing personal or corporate actions that require personal or corporate sacrifices or investments.

Much of the "education" and "motivation" can be catalyzed by civic organizations such as Citizens Against Noise. This relatively new Chicago-based, not-for-profit, corporation is dedicated to one basic goal—"making living more likable." The 11-man board of directors, of which I am a member, has been active on national, State, and local levels to help identify, explain, educate, instruct, and motivate noise producers, recipients, and officials of public agencies who have responsibility or authority to put checks on noise.

We plan an attack first on the major noise sources (as viewed by many): transportation, industry, and construction. Other sources will be tracked in the order of severity and proliferation. Citizens and institutions that wish to enforce and multiply our efforts are being encouraged to become a member of Citizens Against Noise. This may be done by writing to the organization at 2729 Lunt Avenue, Chicago, Ill. 60645.

To explain some of the details of the need for and means of implementing practical community noise control programs, I am submitting a written statement today supplementing this more-or-less philosophical capsule of community noise problems and their solutions. The title of the statement is "Community Noise—In Perspective." It explains the dimensions of community noise problems, the need for providing solutions, and the alternative means that can be employed to educate and motivate people to assume active roles in planning, developing, and implementing "real-world" community noise control programs.

In concluding my remarks, I urge the Office of Noise Abatement and Control of the U.S. Environmental Protection Agency to recommend to the Congress a vigorous federally assisted program of research and local and State aids to place community noise control before the public in true perspective. I also urge that available resources be focused upon "human-engineering" approaches as well as upon "hardware-engineering."

Thank you.

Dr. **Meyer**. Thank you very much, sir. We will be very happy to receive your prepared statement and the testimony—the material that you mentioned—so that we may use it in our studies.[1] It will be in the record and will be utilized in reviewing what the Agency is going to do.

Also I might point out that this type of program that you mention is partly underway in our efforts to develop the report to Congress that I mentioned earlier and in hearings such as this, and are included in the proposal now pending in the Congress to give us that authority. We appreciate your support, and look forward to working with groups such as yours in developing a cooperative effort. Thank you very much.

Mr. **Poertner**. Thank you, sir. If anyone is interested, there are some envelopes on the table—small envelopes for Citizens Against Noise, if you would like to learn how to become a member.

Dr. **Meyer**. Fine. Thank you very much, sir. The next person to appear and give us some information is Mr. Henry Karplus—I hope I am pronouncing that correctly, sir—from the Illinois Institute of Technology Research Institute. Glad to have you here, sir, and look forward to hearing from you

STATEMENT OF HENRY KARPLUS, ILLINOIS INSTITUTE OF TECHNOLOGY

Mr. **Karplus**. Good morning, Mr. Chairman. Mr. Chairman, gentlemen of the panel, speaking for IIT Research Institute, we deem it a privilege to be able to present this statement to you during your search for information on the severity and consequences of the noise pollution problem. Our statement consists of two recommendations that we would like to present for your consideration.

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[1] This material was not received for inclusion in the record.

Dr. **Meyer.** Thank you, sir.

Mr. **Karplus.** These recommendations are based on over 20 years of experience by our organization in the study of problems dealing with the effects and control of noise.

The first recommendation is that broader dissemination should be made of the available knowledge to reduce and control noise pollution. The basic techniques of noise control have been known for many years and these techniques are adequate for the solution of most problems. We know how to construct buildings where the transmission of sound is minimized and we know how to build mechanical devices which operate at comfortably low noise levels.

Unfortunately, however, all too often these principles are ignored, a fact that can be attributed to the average designer's lack of knowledge and experience in this field. The subject of noise control is rarely included in the curricula of mechanical engineers, architects, city planners, and others responsible for the design and location of machinery and factories. Comparatively few universities teach noise control as a separate subject. If taught at all, it is often only a small part of the course in general or architectural acoustics. When noise control is considered as a basic parameter in the design of a machine, structure, or plant, the necessity of studying this subject is obvious.

Since there is a recognized lack of awareness of noise control techniques, designers should be encouraged to utilize the skills of qualified acoustical specialists. These experts can often render a highly valuable service by judging the potential noise characteristics of alternate designs. It is important, however, that their services be obtained early in the design procedure, rather than as an afterthought when changes often become very expensive.

Our second recommendation is the establishment of a broader program of research in noise control. In recent years most research work has been directed toward the solution of complex, specialized problems such as extensive efforts to control jet engine noise, or studies to reduce the noise generated by tires at high speed. While the results of these programs will have a profound influence on specific future equipment, there still are a number of problem areas that will benefit only slightly from this work.

One of the main objectives of a broad based research program should be the development of more economical techniques for obtaining the reduction of noise generated by existing facilities and equipment. Although sufficient technology exists to solve most of the present noise problems, these solutions are often expensive and there is a great reluctance to put them into practice. There are many manufacturing plants and transportation facilities which will be operating for years to come and which by any meaningful measure are far too noisy. These facilities are a nuisance both to those directly concerned with their use and to the surrounding community. If the direct costs of installing noise control were reduced through the development of new techniques, the problems of implementing and enforcing noise control regulations could be made less difficult.

In conclusion, we are pleased to have been able to present this statement and trust that these factfinding hearings will be successful here in Chicago and in the other locations on your itinerary.

Dr. **MEYER**. We appreciate your recommendations very much, sir. They are very well thought out. Panel?

Mr. **HINTON**. One comment, Mr. Karplus. I think your recommendation regarding the noise, the inclusion of noise as a basic parameter in the original design is applicable to all sources.

Mr. **KARPLUS**. Yes, sir.

Mr. **HINTON**. And I think it's an awfully good suggestion.

Mr. **KARPLUS**. So many times we have co[illegible] a situation where it would have cost pennies more in the original design, where it costs thousands of dollars afterwards, if you have to replace something, because you just can't get an isolator in, or the absorbing material in. There are many techniques which are easily applied in the original design which are very, very expensive when retrofitted.

Mr. **HINTON**. New York City has learned this in the purchase of garbage compaction units.

Mr. **KARPLUS**. Yes, sir.

Professor **PLAGER**. Mr. Chairman.

Dr. **MEYER**. Yes.

Professor **PLAGER**. Mr. Karplus, what is being done in education, engineering education to alert the colleges to the problem that you suggest, which is that this become a part of the education program?

Mr. **KARPLUS**. Many of the universities are putting in environmental departments, environmental control departments, noise and general acoustics programs. They are slowly growing; I believe they need more encouragement, and in the environment that I am in at this moment, of the Federal Government, I think the Federal Government could be involved in encouraging, with suitable research projects, to supplement the budgets of universities to advance in this direction more rapidly.

Mr. **MARTIN**. Just a comment, Mr. Karplus, which will be of interest to you—and I know the other members of this panel—a new independent group has just been formed a few weeks ago called the Institute of Noise Control, and, in fact, one of the people who testified yesterday, Lew Goodfriend is one of the people behind this, just for the record.

Dr. **MEYER**. Yes.

Mr. **KARPLUS**. Thank you very much.

Dr. **MEYER**. Well, I have some interest in the educational field myself, and I especially appreciate your comments. I would ask one question; we have two members of the academic community here on the panel, as you know. You sort of hinted a little bit at how you think the Federal Government might help, but do you have any specific recommendations with regard to the leadership role that we might play without getting too deeply involved in academic freedom, to develop some better multidiscipline training programs in institutions such as IIT, and Northwestern, and University of Chicago, and elsewhere around the country?

Mr. KARPLUS. Your question is what the Federal Government could do to help?

Dr. MEYER. To help in this.

Mr. KARPLUS. The problem is always a difficult one, because you do not wish to interfere with the academic freedom——

Dr. MEYER. Right.

Mr. KARPLUS. And yet I believe that the providing of funds for research sufficiently attracts the right kind people to these institutions where they will be able to devote the effort to training young people, if they can be assured of support. There has been a birth of support in this field, except the very specific areas that I mentioned, like jet noise, where aircraft companies and the FAA, and Air Force have put a lot of money into this field. But there are the many small projects which are being conducted, like fan noise in ducts has benefited to some extent from jet engine noise research. But the transfer of information is not immediate, and not that direct.

I believe that the Federal Government could do more work in the immediate area of concern to the people rather than in the rather remote area in which the government has been concerned.

Dr. MEYER. Thank you very much, sir. Your suggestions are well made, and will be well taken. I should next like to ask Samuel Peskin, of the Chicago Hearing Society if he is here, to come forward. Glad to see you, sir.

Mr. PESKIN. Thank you, Dr. Meyer. I appreciate this opportunity to present a brief statement on behalf of the Chicago Hearing Society.

Dr. MEYER. We are glad to have you.

STATEMENT OF SAMUEL PESKIN, CHICAGO HEARING SOCIETY

Mr. PESKIN. Panel members, we are a voluntary agency, voluntary health agency which has been working for more than half a century for the prevention of hearing loss, and the alleviation of the handicapped effects of impaired hearing through education, through demonstration, through research, and through various direct services to the hearing-impaired, and their families.

While we are primarily concerned with the problem of hearing loss, we have also been concerned about the total problem of environmental noise, not only because it contributes to hearing loss, but because of its total human and economic effects, and in March of 1970 we sponsored the first communitywide symposium to be held in any local area on this problem, and to inform the community about it, and motivate interest into action.

Over the years we have had direct evidence of the increasing prevalence and severity of hearing loss that we are seeing in our adult, and particularly in our elderly population.

Dr. Marcus mentioned this morning 20 percent in the 65 and over. Actually we have just done a preliminary pilot research on a representative sample of elderly people, and we find the rate in excess of 40 percent with——

Dr. MEYER. Excuse me, sir. Is this in the older group?

Mr. PESKIN. In the older group, 60 and older. This is just preliminary, and it will have to be confirmed on a much larger sample, but this is the indication. These are people with air conduction, 3 OF 4

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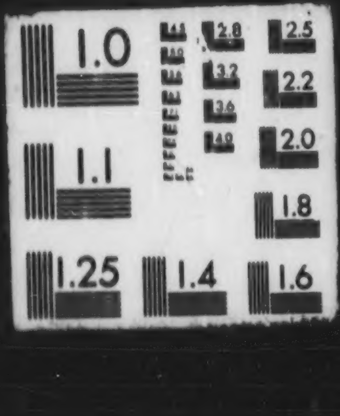
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pure tone air averages of 30 dB or higher, and we can only ascribe this to the mounting level of noise in our environment, both on and off the job.

There is hard evidence in the studies of Lipscomb and others that our young people, in increasing numbers, are suffering permanent impaired hearing.

We welcome the new Federal Occupational Safety and Health Act, and its provisions for more effective protection against on-the-job noise exposure, but we strongly believe that unless community noise is also reduced and controlled, that the effectiveness of industrial noise control will be largely vitiated. The worker who is exposed to high noise levels on the job must have an off-the-job environment sufficiently quiet to permit recovery from the auditory fatigue that results from the occupational noise exposure.

This is one point that we feel is very much, very paramount in all consideration of the prevention and control of the hearing problem. We would particularly urge the Environmental Protection Agency to exert its influence and powers to help set and enforce noise standards for urban rail transportation.

Our own—the reason we are emphasizing this is that our own very progressive new city noise ordinance, very progressive in many other respects, vehicular noise and other, omit mass rail transportation regulations, to which hundreds of thousands of our citizens are exposed for very significant periods of time daily.

The other point that we would like to make is that, as Mr. Harper and Mr. Poertner—and I am sure other witnesses—have pointed out, public education must go hand in hand with control measures. And we, the Chicago Hearing Society and other counterparts of our agency—of which there are some 40 throughout the country—voluntary hearing societies, hope that the Environmental Protection Agency will provide us and other groups like ours with material and other assistance to carry out a continuous vigorous public education program, which we, with our very limited resources, cannot carry out without help.

Dr. **Meyer**. Thank you very much for a constructive and a very useful presentation. Panel?

Professor **Kerrebrock**. You mentioned a very interesting figure with regard to the population over 60, I believe it was. Do you have any information as to the neighborhoods in which these people have lived?

Mr. **Peskin**. Well, this is—we have really just begun to analyze our data, and we have information, we have data that we have gotten from these subjects where they are now living, and where they have lived since birth.

Professor **Kerrebrock**. Do you plan to attempt to correlate the hearing loss with the noise levels in these neighborhoods?

Mr. **Peskin**. We intend to do that, yes, and with their on-the-job noise exposure, and with their leisure time noise exposure, and so on. Actually this is merely a pilot to develop methodology for a full scale study of hearing problems in the aged.

Dr. **Meyer**. Let me ask you one question, sir—excuse the impoliteness of one of the staff bringing me a small problem——

Mr. **Peskin**. Not at all.

Dr. **Meyer**. You mentioned the metropolitan transit. Do you have any information on the noise levels in the actual?

Mr. Peskin. There is that information available, and we can gather it for you. Mr. Karplus has a great deal of this information. He has made several studies, and we will see to it that it is provided. We will see that Mr. Laycock gets it.

Dr. Meyer. Fine. I would appreciate it if you would.

Mr. Peskin. Yes, sir.

Dr. Meyer. With regard to your comment about education, we have been talking to Alice Suter of your national association a little bit about this, and we do look forward to working with you, sir.

Mr. Peskin. Fine.

Dr. Meyer. Thank you very much for your information. The next witness is Mr. Carl Carlson of the United Auto Workers Local No. 6. Mr. Carlson.

STATEMENT OF CARL CARLSON

Mr. Carlson. Mr. Chairman and members of the panel, and ladies and gentlemen:

I am the safety chairman of the union safety committee of the United Auto Workers of local No. 6, Melrose Park, Ill. I represent over 3,000 workers in this International Harvester plant located in Melrose Park, Ill. It is a heavy type of industry. We manufacture diesel engines and crawler tractors.

We have a great many problems in these days of layoffs, shrinking pay checks, soaring prices, and all the other aggravations of modern life; but with all these issues, one of our deepest concerns is the urgent need to upgrade our working conditions.

It goes almost unnoticed that in America's mines and factories and shops every 8½ minutes an American worker is killed—55 every working day; 278 every week, 1,200 every month, over 14,000 every year killed in the ordinary course of a day's work.

We are reasonably sure of this body count, but we are not sure of the industrial accidents that stop short of killing their victims in a number of diseases, fatal and nonfatal, brought on by industrial processes. We can tell how many deer were killed in Wisconsin last year, or how many dollars the taxpayers earned in this country last year, but no person in this room or in this city, or in this country knows how many workers were robbed of their health and hearing in any one industry, or in any one State.

That shameful record year after year is simply tabulated as one of the statistics that affect insurance expense ratings and that grand sum we call "gross national product." As long as the full dimension of the problems are concealed, the effort to achieve effective action will be retarded. Serious efforts must be made to uncover the facts—efforts at least equal to those that are made to keep track of deer and dollars.

There are a great many good men assigned to enforce game laws and tax laws, but no jurisdiction has cared enough about workers to put the same kind of effort into protecting them from death, incapacity or disease, or even recording their casualties. No disaster in history has ever received so little attention as the one that blights the lives of millions of families of American workers every year. Can you imagine the outcry of horror if that annual disaster happened at one time in one place, so its full impact were unmistakably plain? Can you imagine a response if this happened in one city? Can you imagine the response if Americans found out that the accidents were results of apathy and neglect? Can you imagine their rage if they learn that their elected officials had the knowledge that the disaster would happen, and failed to try and stop it?

The power to save these lives has always existed. It exists now. We have a jumble of regulations affecting different workers, administered by different Government agencies. Most of them are weak rules, weakly administered.

Let me cite a few examples: One, the Walsh-Healy Public Contracts Act. This law is 35 years old and never has been enforced, and I know of no personal history of any company being brought to bear to live up to this law. Two, natural gas pipelines. The first year this had six employees to administer this important law. Three, fire research and safety, passed in 1968; no funds to implement it and carry it out. Four, State and community highway safety. A very small portion of money has been authorized to implement this law. Earlier this year Congress has at least accepted the necessity for studying national guidelines to curb industrial abuses, and to establish penalties to make sure these guidelines were observed. This was the Williams Occupational Safety and Health Standard Act of 1970.

We have had many serious problems in my local. We have asked for and received inspections from Federal authorities. We have asked for and received inspections from State of Illinois inspectors. We have had citations after citations given to the company, but because of the lack of enforcement some of these things are still here, and are still on the books since 1967.

And in keeping with this new law, the Williams Act, on May the 5th we sent to Mr. Edward Estkowski, Acting Regional Administrator, Bureau of Labor Standards, Occupational Safety and Health Administration, 219 South Dearborn Street, Chicago, Ill. 60604, the following letter:

> DEAR MR. ESTKOWSKI: Local No. 6 UAW charges management of International Harvester called company, Melrose Park Works, with the enclosed list of violations. Six of these violations are from a previous visit of Mr. Colleran from your office.
>
> There has been a deterioration of many rules and we are hereby notifying you that under the new Occupational Safety and Health Act of 1970 there exists the imminent danger practices here at Melrose Park Works.
>
> There have been many meetings and surveys between management and the union, but management has continued to ignore some very serious violations.
>
> We would welcome your immediate attention and concern.
>
> Sincerely,
> Carl Carlson,
> *Chairman, Safety Committee, Local No. 6, UAW.*

We cited 32 violations of the Walsh-Healy Public Contracts Act and requested, under section 5(a), figure 1, general duty clause, an immediate investigation. We received no investigation From Mr. Colleran or reply from Mr. Estkowski. Receiving no reply, on July 21, 1971, we addressed this letter to Mr. George A. Guenther, Assistant Secretary, Safety and Health Administration, U.S. Department of Labor, 14th Street and Constitution Avenue NW, Washington, D.C. 20210.

> **Dear Sir**: Please find enclosed copy of letter sent to Mr. Edward Estkowski, Acting Regional Administrator, Bureau of Labor Standards, Occupational Safety and Health Administration, Chicago, Ill.
>
> As you will note, this letter was sent to him May 5, 1971 with an enclosed list of violations charging International Harvester Co. with violations of Occupational Safety and Health Act of 1970, section 5(a) (figure 1) of the act (general duty clause).
>
> We have had no response from Mr. Edward Estkowski and therefore are informing you that if we do not receive relief from the violations we will bring action against Mr. Edward Estkowski as per section 13(d) of the act (procedures to counteract imminent dangers clause).

Now, that clause in that new act reads as follows:

> Section 13(d): if the Secretary arbitrarily or capriciously fails to seek relief under this section, any employee who may be injured by reason of such failure, or the representative of such employee may bring action against the Secretary in the U.S. district court for the district in which the imminent danger is alleged to exist, or where the employer has its principal office, or the District of Columbia for a writ of mandamus to compel the Secretary to seek such an order, and for such further relief as may be appropriate.

We have areas in our plant that has both been surveyed by the Federal people, Federal inspectors, been surveyed by the company hygienist, has been observed and surveyed by the State people where we run over 115 dB on the A-scale 8-hours a day, 40 hours hours a week. To me, this is imminent danger.

We have not received any kind of response, except a token response. The company's answer, when we bring these up—it's no disagreement that each of these things that we have, these that they are making an engineering survey on, and it's a serious problem. It's going to cost a lot of money.

We hereby charge that this noise problem has not been given any attention by the Federal inspector, even when union requested help. Management has tried to stop the union from making our own survey, threatening to fire any union man using a noise level meter.

Gentlemen, as I said before, no law, no matter how well it is written, has any meaning at all unless it is implemented both with enough appropriations, with enough money, and, in this condition, in the condition I have cited here, the people that I represent are exposed daily, hourly, to this noise problem. It is a problem that the company is aware of, the company engineers are aware of, the Federal inspectors are aware of, the State inspectors are aware of.

The only response we get from the company is strictly tokenism.

I charge, gentlemen, that any law that must be enacted must have some appropriation, some way of enforcing that law such as we are doing now, in order—a section should be in your law to give the people the right to enforce the law—if necessary going to courts to have it done. That concludes my statement, gentlemen. Thank you.

Dr. **Meyer**. Thank you very much, sir, for an interesting discussion of some of the real problems that exist in trying to satisfactorily control some of our very high environmental exposures, such as exist in industrial plants. And, as you wisely point out, you are well aware of the fact that the Walsh-Healy Act has been rescinded, if I recollect correctly; it was incorporated into the Occupation Safety Health Act of 1970, which you cited as the

Wilson Act. That act came into being, signed by the President late in 1970; the Department of Health, Education, and Welfare and the Department of Labor have been going through an organizational effort to attempt to rapidly reach a capability they didn't have until this act was passed, to deal with the problems that you are raising.

I would like to ask one question. With these identified sound pressure levels of 115 dBA in the plant, of course, this clearly violates the Walsh-Healy, which were carried forward into the new act, until replaced by others. Are you being required to use hearing protection?

Mr. **Carlson**. Only in one area, the engine test area. It's strictly tokenism. If the employee wants to go to the trouble of going to his foreman, obtaining a pass, going downstairs and signing a form, because of this elaborate procedure, obviously the employees don't want to go to all that trouble.

They figure, what is the use? They are the internal type of ear plug, which necessitates keeping them clean. They are hot, they are uncomfortable to wear because of the pressure. Because there is no educational program as such to educate the people on the type of damage that is occurring, obviously they are not using them, or utilizing it to the full extent they should be.

Dr. **Meyer**. I see, because you touched on an important point, the education of the worker to the need for using hearing protection, particularly if management does provide it or make it available. One of the more difficult problems that some of us had in certain situations is to get the worker to realize that by failing to take this protective action he is really hurting himself. I am sure you heard some of the presentations here——

Mr. **Carlson**. That's correct.

Dr. **Meyer**. That clearly show noise can cause hearing loss. I am not familiar with this plant, so I can't get into the debate about the type of equipment and how easy it is to quiet or not, because I don't have the facts. There are certain circumstances, as you mentioned, around the engine test facility when you sometimes have to run an engine, a bare engine.

Mr. **Carlson**. That's correct.

Dr. **Meyer**. I wanted to ask you a question, assuming an enlightened management-union approach. What do you envision the role of the union shop steward in helping to get the worker in those situations where you get an environmental control in using these devices?

Mr. **Carson**. Well——

Dr. **Meyer**. Can the union do something about this with the workers?

Mr. **Carlson**. Yes, sir. We have taken the approach in our union relationship with the company that employment and safety at that plant should be a condition of employment. We have had a lot of criticism because of that approach, but as far as I am concerned, it's better for a man to be without a job than to be either impaired or damaged in some way.

Dr. **Meyer**. Panel?

Dr. **Whitcomb**. This noise of 115 dBA continuous, is it for the entire work shift, or does it vary in amplitude, maybe dropping to 110 or 105?

Mr. CARLSON. In the engine test area, because of the number of engines being tested, it would remain constant. Some of the other areas even go higher than 115—go up to 116—are the areas where they clean parts; these large parts, after being washed, they use a large air hose and the air of 100-pound velocity hitting the different holes causes whistling sounds, and this is where you get a very high reading. Now, there is special nozzles available that cut down the amount of air flowing out of it, but the company tried there.

The engineering department come out and said they ruled them out because they didn't do a good enough job of cleaning, so obviously there the company made a choice whether they wanted a clean product or a noisy product, and obviously they discontinued using the type of air nozzles that would cut down on the noise.

Dr. WHITCOMB. Are the measurements being made in the vicinity of what would be an operator's ear, a man who would have to be there 8 hours a day without any chance of walking in or out of the area? In other words, do you have individuals who have an 8-hour exposure to this level?

Mr. CARLSON. Yes, sir.

Dr. WHITCOMB. And they are wearing earplugs?

Mr. CARLSON. In some areas they are. In some areas they are not. They have no protection at all.

Dr. WHITCOMB. No muffs available?

Mr. CARLSON. No muffs or nothing.

Dr. WHITCOMB. Because plugs can have the seal broken without knowing it for sure, and then their protection is worthless.

Mr. CARLSON. That's correct.

Dr. WHITCOMB. I would recommend highly that you go to muffs, and then you are still—it's a marginal level of safety, because about 30 dB on muffs would be about all you can expect——

Mr. CARLSON. I agree with you, and——

Dr. WHITCOMB. And that brings you down to 85.

Mr. CARLSON. The leadership of our union agrees with you, but the very difficult part about this thing is that we have to try to do it by—I don't want to use the word "coercion"—by education, and the company can do it by coercion. It's that simple.

If you have a man who doesn't realize the full impact of the problem because the insidious thing about hearing loss is that you don't feel it. If you had a—if you felt pain when you had an ear problem with noise you would be wearing protection, but because of the lack of response and the lack of pain, you are not aware of it, that you are suffering this loss until it's too late.

Dr. WHITCOMB. Perhaps you mentioned this, but is hearing being monitored for these people?

Mr. CARLSON. We have had an innumerable amount of surveys, including a 24-hour around the clock, where it was recorded on paper as far as the noise levels, and the noise level varied in this, one engine this action was continuous all around the clock, including Saturdays and Sundays.

Dr. WHITCOMB. I am sorry, I misled you. Is the hearing of the worker in this area being monitored every 6 months?

Mr. CARLSON. Only in the engine test area, not in the other areas where they are using the blow-off nozzles.

Dr. WHITCOMB. Are they seeing progressive changes?

Mr. CARLSON. They would—this information we would not be given, because we asked for a survey before, and the company said we were uneducated, unqualified—we wouldn't know what to do with the information if they gave it to us.

Dr. MEYER. Panel?

Mr. HINTON. I have a question of Mr. Carlson, Mr. Chairman.

Dr. MEYER. All right.

Mr. HINTON. Mr. Carlson, I would like to ask you a question. It has been my observation that the major labor unions in this country have been notably successful in educating their members in many areas. I would like to know if the UAW or any other union that you know about has instituted educational programs to advise their members of the need for protection, self-protection.

Mr. CARLSON. We have a program now that is now being started coming out of Detroit. It is getting around to the financial secretaries and the presidents about the new Williams Act.

But here again it's all based on a voluntary participation by the people, and that is where the real difficulty comes in, because some of these things have to be, must be conditions of employment.

You can't rely on a man you are educating, a man that he is creating permanent damage to himself; you have to insist that he wear the protection, and this is where the unions are in trouble because we don't have that right to shut down an operation. We don't have a right to tell a man, "you can't go to work unless you do this."

The company does. We have insisted the company should follow that procedure; we have insisted the company should do something about it in the area of the high noise level, where it exists, it should be a condition of employment. If the man refuses to wear the proper equipment, whether it's face shield, gloves, shoes, he can't work. It's that simple, he can't work there.

Mr. HINTON. The airlines have a similar policy about ear protection for their employees on the ramp.

Mr. CARLSON. That's correct.

Mr. HINTON. But I would recommend to you that you institute an educational program, and not await the company's taking the action you feel is necessary.

Mr. CARLSON. Unfortunately we have some very, very poor experiences as far as trying to get the company to do something about something that they should be doing something about. For instance, noise problems, we have had noise problems as far as, as long as we have had that plant, because it's very difficult, for some reason, because nobody is against safety per se, or is against noise level readings. Everybody agrees with that.

Where the problem comes in, and when it costs the dollar, when they have to make a choice as far as putting in X number of thousands of dollars to do soundproofing, they have it right here on Michigan Avenue—on Michigan Avenue Harvester has the quietest office. The only noise there is the clickety-clack of the secretaries walking to and from the offices.

We don't expect that kind of thing in a plant, but we expect some consideration when they design new fixtures, when they put in new machining operations that they engineer into those things the proper type of equipment that is necessary, that is available.

Mr. HINTON. Well, I am not disagreeing with you on the point you just made. I was just thinking from strictly the enlightment of your members as to the damage that they are suffering, or may suffer, or will suffer under such conditions that you have described, I would think the union could be very helpful in educational programs, and even to the point of providing the ear protection out of your own treasury, if this has not been forthcoming from the company.

Mr. CARLSON. Well, not that I like to belabor the point, but the education is nice when you have people that are receptive. Sometime we are dealing with people that don't have a proper type of education, that know that they are there to make a living, to work for 40 hours, or do whatever they are supposed to be doing, so they get their paycheck.

It's pretty difficult to educate some of these people when their main concern is problems at home, making out on the job, making the number of pieces during the day, and as far as educating them, I don't disagree with that point, but it shouldn't be the union's responsibility.

I think the company has much more to gain from this, and should be more concerned with it, and not take a negative viewpoint that if it costs money it has to be put off, and something else has to be done, or something else be minimized as far as spending money; spending the money is always the big problem.

Dr. MEYER. Panel?

Professor KERREBROCK. I would like to make sure I understand your position on this, is it that you think that the union membership by and large would accept the position that violation of these rules is grounds for dismissal by the management?

Mr. CARLSON. On a guesstimation, I would say I think that 80 percent of our members would agree with that position.

Professor KERREBROCK. I see.

Dr. MEYER. Thank you very much. I appreciate your coming and giving us this somewhat different problem to look at. Thank you.

Mr. CARLSON. I would like to submit these copies of these letters, and also the thing to the panel.*

Dr. MEYER. I should now like to ask Mr. William Singer, Alderman from the 43d Ward of Chicago, if he is here, if he could come forward. Mr. Singer?

[No response.]

Dr. MEYER. Is Mr. Richard Young, editor of the Pollution Engineering Magazine present?

Mr. YOUNG. Yes.

Dr. MEYER. Good to see you, Mr. Young.

STATEMENT OF RICHARD YOUNG

Mr. YOUNG. Dr. Meyer, panel members: My name is Richard Young; I am editor of Pollution Engineering Magazine, and today I hope to also switch hats and talk to you about some of the other positions I hold.

Thankfully the Federal Government has realized the need for noise controls, first through the Walsh-Healy revisions, and then through the Occupational Health and Safety Act. We are now doing something to protect the man at work, which is of extreme importance. But what happens when he goes home? I think this is of equal importance—and what about his wife, who is also sitting home during this time?

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* This material is on file at the Office of Noise Abatement and Control.

By the establishment of the noise limits and the Occupational Health and Safety Act, the Federal Government has, in effect, established product noise limits.

The reason I say that is because any good plant engineer, or engineer in industry now faced with complying with this Federal law doesn't buy a piece of production equipment without specifying noise limits. Therefore, the Federal Government has, in effect, got into the business of indirectly specifying noise standards.

Therefore I suggest that something does need to be done at home also about specifying noise limits.

We have all got children, and although I have terrible thoughts in my mind how to quiet them down at times, I suppose I can't, but there are home appliances, blenders, mowers, portable tools, all which can be substantially reduced in their noise output.

For example, we can take many of the large industrial machines, automatic lathes, and in the factory for just a few dollars, really, more—often times only a hundred dollars more substantially reduce the amount of noise output that a big engine lathe or a turret lathe can make, and I say we can also do this on a production line basis with the small home appliances.

Recreational nature vehicles certainly need to be controlled. They do present a major problem in many portions of the country, from the minibikes to snowmobiles, and here in the Midwest, outboard motors are of an extremely serious nature, with the noise output. Construction machinery, the methods of controlling noise from construction machinery are known, and have been known for a number of years.

The city of Chicago is now requiring certain types of construction machinery to be controlled. However, we need some sort of standards established whereby all of these construction machines will be controlled.

Actually this gets off into another area that EPA is involved with, and that is the area of solid waste disposal. One of the big complaints that residents of, residents near a solid waste landfill site will complain about, will be the noise from construction machinery, and then finally we get into the area of transportation; cars and trucks for a long time have been muffled, and for a long time have had their mufflers wear out, and have had young high school boys cut holes in them to bypass them, etc. We do need some standards established whereby we can maintain these noise levels for these types of vehicles, but also we need them for diesel trains.

A diesel engine is a relatively simple machine, we will say, to control the noise from, and yet we have a number of suburban areas throughout the United States where diesel trains, diesel engines are parked for hours at a time and allowed to run up, or just sit idling while the crew may be off doing some other duties.

We have a major problem in communities surrounding this area, as in Bensonville, where this is a major yard; in Crystal

Lake, where there are repair facilities. Then, finally going on to the subject of airplanes, airplanes engines, jet engines and piston engine noise can be substantially reduced, and there is a sufficient amount of information available to prove this fact.

We also have a problem, though, in the numbers; in the area of Chicago we have O'Hare Field, which started off as an airport with a relatively few number of pistonoperated planes taking off from it. Then came the jet, which substantially changed the noise level, but also the type of noise being generated, and since 1950, when the jet was introduced into O'Hare, to the present time, the numbers of takeoff and landing operations have substantially increased, so that the airport is no longer functioning the way it was originally designed, and therefore it has had a tremendous environmental impact upon this entire area.

I believe that the Federal Government should establish overall community noise level standards. They have presently, with air pollution standards and water pollution standards, and as those two contaminants, noise also knows no boundary, and therefore should be the control of the Federal Government in establishing those standards.

Additionally I feel that the Federal Government should establish noise limits on specific classes of equipment. As a magazine editor responsible to those engineers who are responsible for noise control, I know that the methods and devices for controlling noise are available, but industry also wants that worker to be protected at home, because he is incurring hearing losses at home, and because of this, he is increasing his absenteeism from the job.

Now, as an environmental advisor to several State governments, I know that States need Federal guidelines to follow. As an educator I know that there is extensive research information which is now available to efficiently control major noise sources. As a pollution control officer I need numbers, and I need numbers that I can easily enforce.

We have many cases where there are noise levels which are established in octave bands, and yet I have probably 1 of 2 dozen octave band analyzers in the entire Chicago metropolitan area. We need limits that are established in decibels—A-scale preferrably—that would make enforcement of noise standards easy.

And finally, as a citizen, I am getting tried of all that noise out there, and I wish something would be done, and I hope that you will do it.

Dr. **Meyer**. Mr. Young, thank you very much. I have enjoyed your presentation. As you know, legislation pending in Congress does indeed cover many of the areas that you suggest.

I was particularly pleased that you pointed out the relationship between another environmental problem, such as the solid waste problem, and the noise problem, in that all of these environmental activities are interrelated, which you and your publication recognize. It points up the need for, within EPA, of all of its elements working together so that we don't windup with somebody giving a grant to some municipality for solid waste disposal activities that results in a source of noise.

Mr. **Hinton**. Mr. Chairman, I have a question for Mr. Young.

Dr. **Meyer**. Yes.

Mr. HINTON. I notice that you recommend the establishment of standards on a Federal uniform basis for these noise sources that you refer to. Now, how would you establish standards for community exposure into terms of a cumulative exposure level as opposed to control at the source?

Mr. YOUNG. Mr. Hinton, I believe that this has been established, the number, the NEF factor was established by Bolt, Beranek and Newman, and has been completed and released to the U.S. Department of Housing and Urban Development, although I cannot truly appreciate it, an NEF factor of 30, because it doesn't particularly mean anything to the housewife, or to most of us here.

I can say that, yes, when I get above 45 dBA that we do have a marked increase in the amount of complaints which come from residents, and I would therefore hope that we would establish an overall community level on the A-scale.

Mr. HINTON. Well, no, I don't believe you can establish community exposure—

Mr. YOUNG. Not exposure.

Mr. HINTON. On a measurable standard that is directly measurable. What we are talking about is the cumulative standard which you referred to, I think correctly, as the NEF—for example, in terms of aircraft noise it probably could be a lid to other sources of transportation—now, what I have in mind is would you support the State establishing community standards, because presumably under our constitutional separation of powers, you have a State where the constitution gives to the States the so-called police powers, which include the environmental control that the State wishes its citizens to have.

Some States apparently are more concerned about the lifestyle of its citizens than other States are. I don't think we are going to change that, even if the Federal Government should desire to.

Now, I guess basically the question is do you favor the establishment of exposure levels, exposure standards on a cumulative basis by States or local government and regional government, or Federal Government?

Mr. YOUNG. I believe——

Mr. HINTON. I am speaking of the enforcement, too.

Mr. YOUNG. Yes, as far as the enforcement, I believe that the enforcement probably is going to be left to the State and local level. It's going to have to be. I simply cannot see in my own mind that the Federal Government can put out enough people to make these measurements.

Mr. HINTON. Well, okay. You know, once you establish a standard and it's adopted, or its modified, if the Federal Government should recommend a standard for community exposure, it would be modified by a State to be more or less stringent, than it would be up to somebody locally, obviously, to enforce it, because this would be a standard which was adopted by the State or local government.

Mr. YOUNG. Yes, right. I would—I would hope, just as the Federal Government has established air quality criteria, that they would establish noise quality criteria. In turn, the State, under the 14th amendment to the Constitution, has this right to protect its residents, and would have to establish standards to meet that criteria, and most State constitutions do have the provision to allow the county municipal governments to also enforce that law, and I would see this as being the logical way to enforce it—although I feel that there is a need for the provision for the Federal Government, in the hat of the EPA to come in if these standards are not being complied with.

Mr. **HINTON**. That might require a constitutional amendment. I am not sure.

Dr. **MEYER**. The rest of the panel?

Mr. **MARTIN**. Mr. Young, you indicated, of course, a strong desire to see the noise of vehicles reduced and, of course, the testimony that was received yesterday from the manufacturing industry, the economic consequences, or cost of doing this was brought out very clearly. Is it your impression that the public would be willing to pay for this, or do you feel that the government should impose certain taxes to pay for bringing this into being?

Mr. **YOUNG**. When you speak of economics and environmental control, it's extremely difficult, because eventually that dime to pay for whatever has to be controlled has to come out of the consumers' pocket. Do I feel that companies should bear the burden? In many cases, yes, I do, because I feel that the technology is available. I am a former designer of mobile equipment myself, and I know, and I know that noise levels can be substantially reduced.

The continual comment that we hear made by various airline representatives will be that if we force them to further reduce the engine noise, that the efficiency would be drastically changed. Well, possibly this requires a drastic change in some of their concepts of design.

Right now, for instance, we have, as far as the automobile engine is concerned, a method which is available for $25 per car that would substantially reduce the air pollution emission below what is required by the Federal Government. It's going to require some work on the part of the automobile manufacturers to incorporate this type of thing, because this was done on the basis of looking at the internal combustion engine as being an inefficient mechanism, and trying to improve it—and they have.

Dr. **MEYER**. Any other questions?

Professor **KERREBROCK**. Yes.

Dr. **MEYER**. Yes, sir.

Professor **KERREBROCK**. You mentioned the problem of noise due to appliances in the home. I think this is a very, very important problem, and I would like to get your feelings on one aspect of it. I know of a case where a certain company built two models of dishwashers. One is expensive, the deluxe model, and the other one is a functionally identical model, but it's stripped, and the deluxe model is sound proofed.

Now, I inquired of the salesman when we were interested in one of these dishwashers as to whether I could buy the stripped model, but with the soundproofing, and not the other features, and the answer was no, this is the way it comes. The difference in price was about $50.

The question is do you think that if sufficient pressure were brought to bear, the noise soundproofing could be introduced to these things that are required on these appliances without the other features? And is there a mechanism by which we could do this?

Mr. YOUNG. Could noise control be incorporated without——

Professor KERREBROCK. Yes.

Mr. YOUNG. Including some other automatic features?

Professor KERREBROCK. Maybe more specifically, do you think that if the noise output of devices was somehow publicized, put on the label of the appliance, the public would respond?

Mr. YOUNG. I don't believe so, no. I don't believe that most of the audience out here knows what a decibel is. Most of my contacts that I have, who are fellow engineers, we all had this schooling, we all had in school something on acoustics in physics and electrical engineering and, of course, the moment we all got out of school, we all tried to forget it as fast as we could do.

It's tough enough talking decibels without going in and talking octave bands. I don't think the people can appreciate what a decibel is, and what it means. I think that the label on the blender would have to be the type that it's on, the type that you have on a cigarette package instead, a little stronger warning.

Dr. MEYER. Would my colleague yield a moment to the chairman? What you are saying is the same thought that has been concerning us, because if the administration's legislative proposals are enacted by the Congress and some of the nonadministration proposals also include this labeling requirement, it's causing a lot of concern for the very reason that you mentioned. We have explored some ideas, and we are going to certainly talk to a lot of social scientists and communications people to get at this, because maybe what one has to say—and I don't know how you say it on a blender base maybe that big, [indicating], or on the side of a garbage disposal sitting in the showroom, but maybe what you have to say is, "When you are using this device you can't hear a baby screaming if you are more than 3 feet away," correlate it that way, you know. I mean, the housewife, or even the other wage earner, or the other members of the family who are concerned with this can correlate that sort of interference, so I think the thought is well made.

I don't really think of the dBA on the side of a blender or vacuum cleaner as being very meaningful, and I am not denigrating the knowledge of the American public. As you mentioned, there are a whole lot of us who are engineers and scientists who have difficulty coming up with understanding some of this.

Mr. YOUNG. I believe this is a very serious problem you are going to have, if you are going to be required to do any labeling, and very probably what we need is a program such as the old FWQA had, the Federal Water Quality Administration had where it tested the amounts of phosphates in detergents and then publicized this by brand name. Possibly we have to publicize all of the decibel levels of all of the blender manufacturers.

Dr. MEYER. That is an excellent suggestion. Thank you very much. I yield back to you, if you have any further questions.

Professor **Kerrebrock**. No; I think that helps a good deal. In other words, this might help, but really the road to success is through regulation rather than just publication.

Professor **Plager**. Mr. Chairman.

Dr. **Meyer**. Yes, indeed.

Professor **Plager**. One comment, if I may, perhaps elicit your response to this, and that is your call for some sort of noise criteria, for noise standards. You made the analogy to the air quality standards, or the ambient air standards, ambient air criteria.

I am sure you are familiar with the history of both air and water standards, ambient air standards which we have had for a number of years, and which have had absolutely no impact on improving the condition of either the air or the water, and that there must be a step beyond that, of translating those into some sort of performance standards, or some sort of emission standards, and the difficulties that we are now finding ourselves in, so that may I take it that your call for some sort of general noise criteria would go beyond simply establishing criteria?

Mr. **Young**. I think it should. I think it should go beyond that, and possibly in the field of noise we have to get down and establish numbers. But again I say that if we are going to think in terms of establishing noise levels with numbers we are going to have to make it nice and simple to enforce, or it's not going to be enforced.

Dr. **Meyer**. Thank you very much for stimulating our thinking as to some things we need to look at very carefully. It now being 12 p.m. let me ask before we recess for lunch, if Alderman Singer is here?

[No response.]

Dr. **Meyer**. Ladies and gentlemen, we will recess for lunch at this point, reconvening promptly at 1 p.m. at which time we will continue with the various witnesses who have asked to be heard. Thank you for being here.

[Luncheon recess.]

AFTERNOON SESSION

Dr. Meyer. Ladies and gentlemen, may I call to order the fourth session of the Environmental Agency's hearings on noise, which, as I announced earlier, is being conducted under Title 4, Public Law No. 91.604.

I have had delivered to me by special delivery a statement by the Honorable Roman C. Pucinski of the 11th Congressional District of the State of Illinois, with a request that this statement be included in the record, and that I read from it. With appropriate deference to the legislative branch of the government, I am pleased and honored that Congressman Pucinski has seen fit to send this statement. I shall read it for the record:

> Gentlemen, back in 1844, the German philosopher Arthur Schopenhauer observed that "the amount of noise which anyone can bear undisturbed stands in inverse proportion to his mental capability * * * . Noise is a torture to an intellectual people."
>
> Many of the people in my congressional district lying to the east and south of O'Hare Airport are tortured daily by the intolerable levels of jet noise. Since my first election to Congress in 1958, I have devoted a great deal of effort and time to alleviate this serious problem.
>
> Noise pollution is not a new phenomenon. In fact, the word "noise" comes from the same Latin derivative as nausea. Julius Caesar even had his troubles with noise pollution. Caesar, however, did not have to deal with the "guideline writers" at DOT, FAA, EPA, NASA, HUD or any other government agency you can think of. When the clatter of chariot driving disturbed his sleep, he simply banned their use at night.
>
> Although not new, noise pollution has reached a crisis stage. Excessive noise has become a way of American life—to a point, I believe, where America is now the noisiest country in the history of civilization. That is scarcely a distinction we can be proud of.
>
> As a result we suffer from chronic fatigue, increased blood pressure and decreased working and mental efficiency.
>
> The International Standardization Organization of acoustical experts has warned that "if airplane and vehicular noises continue to climb at their present rates, everyone living in a city will be stone deaf by the year 2000."
>
> "The present rate of increase is 1 decibel a year, according to this report. To make the picture even more ominous, it is estimated that by 1980, 78 percent of the American population will be living in 12 major metropolitan areas. Incredible as it may seem, leading experts tell us of the strong possibility that 78 percent of this country may be deaf in 30 years.

Surely we can all agree that we are in the middle of a crisis and action—not speeches, not proposed rulemaking, not more studies—action is required.

I am confident we will succeed in frustrating this grim prediction by taking effective measures before it becomes a reality.

We had the first real stirrings of action back in 1968. Legislation I cosponsored was enacted into the Noise Abatement Act. Public Law 90-411 provided a legislative mandate to the Federal Aviation Administration to regulate aircraft noise. The FAA was authorized to establish comprehensive noise regulations concerning present and future aircraft.

Since enactment, the FAA has implemented only part of Public Law 90-411. Part 36 of the FAA regulations established 108 EPNdB as the tolerable noise limitation for future subsonic aircraft. (108 EPNdB is about the level of noise heard inside a subway car moving at 30 mph.) No noise regulations have been adopted for the current jet fleet, such as the DC-8, DC-9, 727, and 707—all of which operate in excess of 108 EPNdB. Only the DC-10 and 747 are now operating at 108 EPNdB or less.

Last year, the FAA issued an advance notice of proposed rulemaking on noise reductions by current jets. By their own admission, no new regulations will be issued before the end of 1972.

Anyone familiar with administrative rulemaking knows that the announced time goal won't be achieved. The date already has been set back more than a year. The ponderous bureaucratic maneuvering will inevitably further delay any meaningful rulemaking.

So what can be done now? There are three basic approaches to the reduction of jet noise:

1. Move the noise away from the people.
2. Move the people away from the noise.
3. Reduce the noise made by the airplane.

Airports have been doing all they can to implement the first approach. Approach and departure paths have been established to minimize flight over residential areas. Steeper climbs and descent paths, at all times consistent with safety, are being followed.

The second approach—moving the people away from the noise—is totally unacceptable.

In the first place, most of the homes near O'Hare were there well before it became the world's busiest jet airport. The relocation of hundreds of thousands of people, the disruption of their lives and the destruction of entire communities is no real solution.

Yet that approach is receiving serious consideration and in some cases is being implemented. The city of Los Angeles recently bought a home for $97,000. It will now pay someone to demolish that home. This is taking place as part of that city's land use program. By the time this stage is completed, three residential neighborhoods will have been wiped out. Eight thousand persons will have been moved at a cost to the city of more than $200 million.

There are tens of thousands of people living near Los Angeles International Airport. It seems readily apparent to me that this means of removing noise disturbance to the people below by removing the people just won't work.

NASA and DOT estimate the high noise areas around J. F. K., Los Angeles and O'Hare airports amount to about 42,000 acres—which is three times more than all the land redeveloped during 16 years of urban renewal at a cost of more than $5 billion.

Even if it were economically feasible, why should people be disrupted and displaced to solve a problem not of their own making?

A recent study was conducted by the Northeastern Illinois Planning Commission for the Department of Housing and Urban Development. The report concludes that the idea of buying up homes around an airport is, as one source said, "sound."

That conclusion must not be allowed to stand unchallenged. It is economically and humanely unjustified.

The best, most comprehensive, and effective means of reducing noise is by getting to the source of the noise. In order to do that, I have introduced legislation, H.R. 10136, to reduce jet noise by 50 percent by 1976.

The legislation provides:

1. That noise levels of current aircraft must be reduced by 10 EPNdB or meet part 36 noise levels of 108 EPNdB, whichever noise reduction is greater.

2. The U.S. Government will provide $35 million to demonstrate the feasibility of retrofitting.

3. The U.S. Government will provide guaranteed loans to carriers for the purpose of modifying their aircraft prior to 1976.

4. A rate increase to cover the cost of retrofitting.

5. Grants to State and local agencies to pay the cost of administering airport noise monitoring systems.

We have paid for study after study of the feasibility of retrofitting—installing acoustical material in the cowling or housing of jet engines and enlarging the size of the engine's exhaust outlets.

The NASA Douglas/Boeing studies and the FAA Rohr report indicate that a complete fleet retrofit can be accomplished within 5 years from the time a program is established.

NASA has awarded an $18 million contract to General Electric to develop a jet engine which will produce 20 less DCB's than present engines and GE hopes to be testing such an engine by the end of this year.

The industry does have the technological capability to achieve this goal. In contrast to the billions and billions of dollars required for a land use program, retrofitting of the current fleet would cost about $856 million. The NASA tests demonstrate that retrofit can reduce the noisiness of landing turbofan aircraft by 50 percent and reduce the noise affected area under approach paths by as much as 85 percent.

Retrofitting is an expensive item. I am mindful that the airlines could not undertake that program without assistance. My bill provides up to $1 billion in guaranteed loans for the airlines. It also instructs the Civil Aeronautics Board to approve a fare increase of about 1 percent if the airlines do request to pay off these loans for retrofitting their aircraft with quieter engines.

The Environmental Protection Agency has an important role to play in noise pollution control and abatement. It can be a strong advocate of legislation such as I recommend and can provide the incentive and inducement as well as enforcement of other steps toward reduction of noise.

For more than 10 years, jet aircraft noise has adversely affected the quality of life in communities near major airports. How long must they endure these intolerable—literally deafening—levels of noise? I say no longer and urge the EPA to be a strong factor in bringing meaningful relief.

Since Congressman Pucinski does not have a staff member here, panel, if you have questions and desire to give them to me, I will transmit them to Congressman Pucinski and see to it that he and his staff furnish us replies so that we may include them with the record.

Now, the question of O'Hare has aroused some interest and some degree of controversy, and I should like to read for the record a telegram that I have received; the telegram is as follows:

> Dr. Alvin F. Meyer, Jr., Director of Noise, Environmental Protection Agency, Sheraton Hotel, Chicago.
>
> Deeply shocked at your public suggestion to destroy homes in the O'Hare area; dismayed that you would urge action prior to conclusion of present hearings seeking solutions to aircraft noise. You should be protecting environment for people, not aircraft. Relocate aircraft rather than people.
>
> Please clarify your position prior to conclusion of Chicago hearings today.
>
> Alan M. Abrams, alderman, eighth ward, Des Plaines, Ill.

Now, I have read the newspaper accounts of the interviews, and screened the television tapes of interviews with me on that subject, and I find nowhere in there a statement that I recommended this as an action. For the public record I should like to read the telegram that is going to be dispatched within the next few minutes to the Honorable Alan M. Abrams, alderman of the eighth ward, Des Plaines, Ill.

> Reference your telegram as to O'Hare Airport, I am as deeply shocked as you regarding any misrepresentation of my position on aircraft noise control.
>
> My view is that there are many possible solutions to the complex questions of control of the environmental problem. Among the possibilities are control of noise at the source, relocation of the source, placing more distance between sources and receivers, control of time of operation, reduction of number of operations and occurrences.
>
> In each case, what is ultimately done must be based on a judgment of economics, social need, and technological capability and progress for control expected.

What is right for one situation may be exactly the wrong thing for another. Specifically re O'Hare, I did not and do not endorse, suggest, or advocate a particular course of action. That is a matter for decision by the people of the communities affected through established political processes.

I would be pleased to discuss this with you further, signed by myself.

The record shall so show this. Will you have that sent, please?

We will now proceed with the course of our hearing, and as an aside, I will say I would be pleased to discuss this issue, but the Environmental Protection Agency is in the process right now of getting facts and information as to what needs to be done. And I certainly do not want to prejudge the results of a very extensive study, and the results of these hearings, by attempting to come up with off-the-cuff recommendations as to solutions of local problems with which I am not thoroughly familiar. I hope I will become more familiar as a result of some of the witnesses who are about to appear, so at this point I would like to ask Mr. George Franks if he would come forward. I understand he is the chairman of the O'Hare Area Noise Abatement Council, and I hope that he will illuminate myself and the panel, both orally and otherwise. Sir, nice to have you here.

Mr. **Franks**. Thank you, sir. I will try to make this as brief as I can, because of the urgency of time—I understand all of you gentlemen are in that spot.

Dr. **Meyer**. Sir, would you get that microphone a little closer to you? I want to be sure the audience, as well as the panel, can hear you

STATEMENT OF GEORGE J. FRANKS, O'HARE AREA NOISE ABATEMENT COUNCIL

Mr. **Franks**. All right. Am I getting through now? I would like to say my name is George J. Franks. I am the president of the O'Hare Area Noise Abatement Council, and I will go into that a little further shortly.

The O'Hare Area Noise Abatement Council was not something that was planned and worked at. It happened—it happened out of sheer necessity. It all started back in 1965—let's say that my interest became started in 1965. I lived in the area, and I have pictures to prove it, which I will later on pass out—I won't take up the time to show you some of the areas that we live in, and they are beautiful.

We never saw a plane, never saw one. Then in about July of 1967, we said, "What is that?" And it came directly over the homes, and I got a few phone calls.

I happened to be president of the Homeowners' Association at the time, so I got a few phone calls. Well, they went on for a bit, and then we started to look into it, and then in checking it out we find that the planes were turning—now, we were told that there was some repair work going on in one of the runways, and until that repair work was finished, we would be disturbed.

Well, being temporary, we all had that patience. It's an American characteristic, and it's also an American characteristic to get in touch with your congressman. We got in touch with our congressman, Congressman Erlenborn, and he was very accommodating. He came down and talked to us, and then he looked into it, and he wrote a letter—and I have a record of that letter saying there is some repair work going on a few runways. While it's being done, we would have to suffer for awhile, and so let's wait through the summer months, let's wait and see.

We decided to wait and see what happened; nothing happened. It just continued to get worse. Then the mayor of Wood Dale at that time was getting very much pressure put on him that I wasn't aware of, and other mayors of other towns, and presidents of other towns were getting pressure put on by their constituents.

Out of sheer necessity they had to have a meeting—a meeting of the minds, so to speak, to see what could be done about the growing menace of O'Hare International Airport. I was requested to chair that meeting temporarily, so that is how it started. And then I was elected the chairman, and we incorporated, and now I am the president, and it just grew on and on. It's very important that everybody know it was not planned; we didn't work at it—it was just out of sheer necessity. Now, this O'Hare Noise Abatement Council was incorporated not for profit. I have here a few of our purposes of the meeting:

> To promote and encourage laws for the protection and conservation of the environment in general, and specifically, protection against specific noise pollution caused by jet aircraft.
>
> To encourage, by legal means, the enforcement of legislation against all means of polluting, and especially against noise pollution.
>
> To promote, foster, and encourage education of its members and the general public to the dangers to the environment caused by excessive noise, especially noise caused by jet aircraft.
>
> To promote, foster, and encourage the actions of all governmental agencies to limit the use of O'Hare International Airport in Chicago, Ill., to the use and capacity as it was originally designed.

I have a few others, and I will pass them up.

It's very important that we say "to the capacity and use as it was originally designed," because it has been a growing monster. It's getting bigger and bigger. The people that are affected by this noise had to have someone to turn to.

Apparently our council was the answer; they could vent their fury on us. We listened to them. We got letters, and I have enough documentation—I will just refer to them, and later on I will back them up, if necessary.

In addition to the public participation we have got resolutions from school district No. 100, from Dr. Zuckerman; school district No. 2, from Mr. Kenneth Kaufman; we had the Maine Township District 207, from Mr. R. R. Short; the board of supervisors, the County of Du Page; and the board of education, Mannheim District 83.

I want everyone to understand that we are a responsible due process group. That is the only way we are going to operate, and we have brought it up to this—I will clarify that a little later—we have letters confirming official appointment to the O'Hare Noise Abatement Council from all the elected governing bodies of the villages.

We are still respected. They have a man, through vote, resolution, vote, and installation that we have a member from every village on our council, and that is 19 of them, and it's since grown —I will only speak to those I can document.

When the airport, and we were very aware of it, the airport was about to be expanded, we requested from all the villages resolutions condemning the expansion plans of the city of Chicago, and we got them, we got 17 resolutions, and I can document that.

Then we had—I wanted authorization, official authorization from the governing bodies authorizing the circulation of petitions to be signed ,to be delivered in person to Washington, and I got that.

This tells you of the kind of people we are, whom we represent, and why. It's not a few people; it's not one, it's not just myself, or three or four men—it's the entire body.

The problem is very, very, very serious. We have listened—we have listened to very many experts, scientists, and physicists. We know the problem. We realize and sympathize with them; all we want them to do is to know of our problem and sympathize with us.

We—I will go down to the citizen; the citizen has no expertise. We are just judges, as judges without trial, frankly, but we are trying to get that phase of it done.

We have gone through step by step by step. We had a mass meeting in Bensenville in May of 1970—our council is not that old. Now, as to when the city of Chicago petitioned the Secretary of Defense for transfer of 365 acres of land, that was the first thing that we did accomplish, and publicly I would like to thank the four congressmen who were very great, they sincerely cooperated. We had a mass meeting, got publicity, and we wrote a letter to the President, directly to the President—I have a copy of that, but I won't go into it because it's pretty long. All I wanted to give you was our logic, and the reason for how we talk.

Dr. **Meyer**. All right.

Mr. **Franks**. At that meeting we wanted to unlock the silent majority that is often referred to, and the last flag I saw representing the silent majority had the stars and stripes—the silent majority has to wake up, or they are going to be buried. I refer to that in the presentation, and I requested letters to write through due process. We apparently got the letters because we got all the action in the world, and the process was stopped, the transfer of land was stopped.

Four more runways are going in, after all our crying and hollering and complaining and doing it legitimately, the only understanding we got, "Go ahead with the airport."

I got an answer from the Justice Department, which is the only authority—I don't want to get into too much detail, it's not that important—we heard from all the congressmen; then we met with the congressmen individually, and we met with the congressmen collectively, along with the mayors, and the mayors and the citizens, along with the congressmen in one group meeting, and at that time—and I will get down to that—we requested nine points. In my summary I will finally say that what we have requested from our congressmen we are requesting from this Board.

Our original purpose, to start with, when we first began, we knew how far we could get because we were that sensible. We knew that if we got it to this stage where we are at today—which I call a "congressional hearing"—I think it's about as far as we can go.

You have heard the experts; you have heard the scientists, and the physical results—people are peculiar. You have to understand the general public. Apparently the elected officials do understand the general public, and certain people in the position to exploit the general public understand it, because they know what to do.

We, being a citizen affected by the noise, also understand that they understand, and we are talking about—we are taking appropriate actions. We have gone as far as we know how to go.

We have this notation—we have made enough noise of our own now, to emphasize that, we have noise, so apparently as a result of that we had the new noise regulation of the city of Chicago. They do not exempt airport noise, but they don't talk about it, either. There is no enforcement, so it's like going to the city of Chicago and saying, "We lost a button," so they sew up the hole. We still got the problem.

Dr. **Meyer**. That is a beautiful analogy, sir.

Mr. **Franks**. I would like to say that when you cut out one segment of our society in any ruling, it is unfair and discriminating. In our efforts—in our efforts to pursue our point, and I would like to illustrate now about expert testimony, I have a picture here which I will submit as evidence, and I have a little note attached, and the little note I attached is just enough for you to give your Board some information:

> Dr. Alvin F. Meyer, Jr., Director.
>
> The attached copy of the Franklin Park Herald dated July 22, 1970, tells the story of jet aircraft noise and dirt as affecting Franklin Park and Elmwood Park.

Dr. **Meyer**. It's received for the record, sir. It will be incorporated.*

Mr. **Franks**. This is the Mont Clare Leyden Herald. Here is a little girl—I would like to have all these reports and all these committee hearings we have gone to the NASA report NIPC report, and the State subcommittee hearings, we have attended them all, the Illinois Pollution Control Board Hearings, explain this to this girl, what is a decibel?

She is about 8 years old. Now, you just tell her that a decibel is not noise, it's only 15, 20, 80, or 100, she doesn't know this. This is the result, and, of course, the experts have told us this.

This reads:

> The attached copy of the Mont Clare Leyden Herald dated August 5, 1970 details the impossible, unbearable, dirty jet aircraft noise as affecting Schiller Park residents. The citizens in this area are in a state of complete despair, and reflect an attitude of "no hope."
>
> Until acceptable solutions are available OANAC suggests to shut down

Nothing can be done to help these people, nothing. Did anybody ever think about shutting down that runway? Business is bad anyway, I understand. Mine is. I guess the aircraft industry is also having a little bit of suffering, but I would like to have some of the experts tell me how to explain this to these people.

Now, we went through the Federal Aviation Administration several times. I am not going to go through all the details. I will just give you a brief synopsis, I will submit it as evidence. The O'Hare Area Noise Abatement Council and the Federal Aviation Administration, on October 13, 1970, had a meeting.

Page 1, confirming meeting and the date.

Page 2, the list of participants that were in there.

Page 3, my presentation to the meeting, showing our five points.

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* This material is on file at the Office of Noise Abatement and Control.

Now, we asked for five points on page 3. The conclusions, noise abatement procedures which they had submitted at the time, and we still have a copy. The noise abatement procedures are not worth the paper written on, agreed to by all.

We changed one turn, 27L, changed 27L from 290° to 280° to help Elk Grove. Then the run-up problem—Pat Dunn, airport manager, "We are going to take care of the run-up problem," and we want the glide slope raised a bit. Then appoint responsible people to advise Mr. Schwank and Mr. Callahan to monitor the noise abatement procedures.*

Now, we have had this noise abatement procedure for some time at O'Hare, but there is no policing it, and I got that covered in my nine points. I will get to that a little later. We are asking for federally appointed referees or supervisors, or a captain of O'Hare Airport to have a monitoring system, which we must have.

Now, we had a meeting here with the congressmen and the mayors. Now, I brought this along for one reason, which is to show that we are a responsible group, and who is involved. We have got to prove the magnitude of the job. It's not a few, it's not one or two.

I guess that is on August 17, 1970, a meeting with the Congressmen, four congressmen and the mayors shows signatures of 34 delegates representing 19 municipalities. Six mayors have signed this—six mayors as well as other governing officials. The nine points were recommended by the O'Hare Area Noise Abatement Council to Congressmen Collier, Crane, Erlenborn and Pucinski in that meeting of August 17.

News release from Congressman Erlenborn in summary of the above meeting, recognizing the nine points. The nine points that we are asking for—and we are, in turn, asking this panel to please consider—and I have others—are:

1. Limit flights to 100 per hour as prior to East-West Runway installation.

We ask this because we weren't told there was a new runway put in. They told us, confirmed by Mr. Erlenborn, to wait and see when the repairs got finished on other runways, we would be relieved from the noise. Then we find out that, I guess, everybody was misinformed—as politely as I know how to say—and we found out a new runway had been opened, quietly, peacefully—except for the noise.

2. Close airport 11 p.m., to 7 as is done in Europe.
3. Legislate procedures for supervision of noise abatement.
4. Provide for appointment of noise abatement control officer.

That is what I had reference to.

5. Terminate all runways and taxiways expansion plans, including all work in process.

That leads me, before I go on, to that new Northeast-Southwest runway; I think it's 422, it's about to be opened.

Now, I have the date of this meeting, August 17. Do you know how much action we had planned making everybody aware what our problem was, and the only sympathy we got was they continued to go ahead, and the runway is going in.

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* This material is on file at the Office of Noise Abatement and Control.

Now, we will get more members on our council as the problem starts to hit them. It might be advisable at this time to sort of illustrate that the noise is a peculiar thing; if you are not there, of course, there is none. Then how can you understand it? I will pick that up a little later in my letter to the airlines, we left no stone unturned.

6. Establish acceptable Federal commercial aircraft noise standards.

Federal Aviation Administration has established standards. They established these standards according to what is best, or what can be done, could be done with the state of the art at the time.

Well, if the best they can do is 108 and 109 decibels, then we just don't, we can't accept that. We are this country, and we are the very citizens that this country is for, and if you want to discuss the quality, is there a better cross section than, let's say, an affluent suburbia; where do we go from here?

7. Provide funding for modification of existing engines for noise reduction to conform to noise standards.
8. Allocate SST funds to engine noise reduction retrofit costs.
9. Begin construction of another airport.

I was very careful not to say "the third airport," because the third airport has already been put in at O'Hare. I am not even sure we got the first airport. We don't consider Midway an airport. We don't want our problems transferred out there. If they agree to take half of our flights and put them out to Midway, what kind of hypocrites would we be, to take a problem from us and put it out to Midway?

We need an overall answer, a complete answer for the good of the people. Well, these were the nine points that I submitted to the group at that time in the meeting with the congressmen and the mayors, and the congressmen have been working on them. I have the letter of confirmation acknowledging the meeting.*

I have another one here that—before I get into my own dissertation, here is a picture of an airplane [indicating].

My note to you, Dr. Meyer:

> A picture is worth a thousand words, and the attached is proof of the problem to illustrate the point. The story details some of the action involved, names and number of communities involved.
>
> Your group can study that.*

I couldn't help cutting this out. This is a NIPC report, and I will just leave it here for your study.

Dr. **Meyer**. All right.

Mr. **Franks**. Now, how far has all this work gotten us. We have—we know of all the reports that were out. The NIPC report was turned out. We were asked how we felt about that 15-month report being undertaken by NIPC.

Well, my answer to that was we don't want to wait 15 months. That is a long time, and the noise is here every day, every night, and how do you justify a thing like that to a man hanging by his thumbs; every second is an eternity, and we have got it all the time.

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* This material is on file at the Office of Noise Abatement and Control.

We had our Illinois Pollution Board hearing in Park Ridge. There was a general comment of everybody attending that meeting, and there was an absence of the noise, so it seems like word does get out. In order to promote——

Dr. **Meyer**. Could I interrupt, sir—I have an urgent call from Washington. I want to hear everything you have to say. Can we recess for about 4 or 5 minutes?

Mr. **Franks**. Certainly.

Dr. **Meyer**. With your permission, sir.

Mr. **Franks**. Yes, sir.

Dr. **Meyer**. Thank you, because I want to hear everything you are saying.

[Short recess.]

Dr. **Meyer**. Ladies and gentlemen, thank you for your indulgence. If I can reassemble my panel, we will reconvene after this brief, but rather necessary recess.

We have got a quorum. All right, sir; continue, sir.

Mr. **Franks**. Since all this work notwithstanding into the, involving the airline owners, developers, design engineers, et cetera, with all this work going on, I must remind you to remember that the noise has not stopped, and people are still suffering under this noise, plus also remind you when you leave here, if you don't have this problem, it will be completely forgotten.

But those that have the problem, they go home to the same noise, so it can never be forgotten. We are reminded of it throughout the day and throughout the night—sometimes more severe than others, but it's constantly there, it's a severe, rotten headache, and we don't like it at all, and in our pursuit to get something done as rapidly as we know how, we appealed, and wrote a letter to the Illinois Pollution Control Board, which I will include also as part of the information to your committee, Dr. Meyer. The letter reads as follows:

May 8, 1971.
State of Illinois Pollution Control Board,
189 West Madison St.—Suite 900,
Chicago, Ill. 60602,
Airport Noise Standards Hearing,
Samuel T. Lawton, Jr., Hearing Officer.

Gentlemen: One purpose of this letter is to express the support of the O'Hare Area Noise Abatement Council for the program embarked upon by the Campaign Against Pollution (CAP) organization. Although we cannot judge technical excellence of the material submitted by CAP in their proposal, we do heartily endorse their recommendation to alleviate aircraft noise by whatever means necessary. Further, we wish to add comment on the unbearable aircraft noise surrounding O'Hare International Airport.

I, and several members of the O'Hare Area Noise Abatement Council, have already testified before your committee and have made our views known. We wish to again go on record to underline the serious need for relief, and to emphasize the enormity of the problem. It is not a single area, nor is it a single group that is affected. Rather, the magnitude of aircraft noise pollution is far reaching and widespread. The O'Hare Area Noise Abatement Council, encompassing some 31 communities contingent to and surrounding O'Hare International Airport, expresses the deep concern of many thousands of citizens in the communities affected by aircraft noise.

The State of Illinois has set the pace for noise and air pollution legislation, and your committee, being an important part of that program, is to be commended for its role in the total undertaking. Through the hearings and testimony submitted, a complete record of expert information and facts has been gathered, which when properly correlated, will chart the path for aircraft noise relief. The Illinois Pollution Control Board is an excellent example of due process in action and can only lead to adequate regulation of the noisemakers. We are therefore appealing to your Board to recommend that laws be applied equally to all offenders, exempting no one, including aircraft.

We question the discrimination practiced by the FAA and airport operators when they decide what planes will fly over whom and for how long. We question placing a higher priority on aircraft passenger comfort than on the welfare of helpless residents. We question the practice of discrimination against homes, health, and the contentment of so many, again, for the comfort of aircraft passengers. We question the set standards which discriminate against taxpaying homeowners for the benefit of plane schedules and costs. We question all of these, and many more discriminatory practices. That this should exist in an era when discrimination is outlawed is almost unthinkable.

We will soon feel the impact of new antinoise regulations upon private enterprise and upon ourselves, ordinary citizens. Yet aircraft noise is exempted. The very people who have cried out for help will be the ones made to pay. Why this discrimination? We are appealing to the Illinois Pollution Control Board to include this in their report and recommendations.

We will soon see this law enforcement swiftly swoop down on offenders such as noise from trucks, defective car mufflers, lawnmowers, automobile horns, automatic machinery, punch presses, and other vital industrial equipment. The fines will be stiff and the punishment severe—including plant shutdowns. We appeal to the Illinois Pollution Control Board to question why aircraft noise remains the only privileged nuisance in our otherwise just society.

Recently the airlines spent money freely to improve comfort and service to the traveling public to encourage more business to offset the recession. Money was spent to make bigger and bigger planes with more and more seats. More and more planes were added to more and more routes. All this, of course, with no consideration for and directly against the best interests of the noise-burdened residents surrounding the airports. Now, more money is being spent to remove seats, install cocktail facilities, and kitchens to increase passenger comfort. Costs do not seem very important.

We are appealing to the Illinois Pollution Control Board to demand an immediate engine retrofit program for noise control, costs notwithstanding, to make modern air transportation almost as comfortable for ordinary citizens as it is for air travelers.

Insulating, at great cost, public places such as schools, churches, hospitals, restaurants, office buildings, and the like, would probably accomplish a degree of noise relief. However, for homeowners, we must insist that insulating homes is out of the question as a total solution to the noise problem. Noise cannot be insulated from outdoor living, which is the primary reason for suburban development. Outdoor living is one of the greatest and most important parts of our lives. And presently many governmental agencies have made it a policy to encourage greater outdoor opportunities, including parks and other facilities, for everyone. We urge the Illinois Control Pollution Board to recommend that our right to enjoy the outdoors be preserved.

The city of Chicago is incapable of and unwilling to control aircraft noise. The city of Chicago is still attempting to effect the transfer of 365 acres of Government-owned land for further airport expansion, in direct contradiction to evidence submitted by the various investigating committees. All of our complaints and all of our pleadings have fallen on deaf ears in the Chicago City government, which presently enjoys the control of and the profits from O'Hare. They are not responsive to the interests of any citizen suffering from aircraft noise problems, particularly those outside their own boundaries. We must emphasize that this control of this facility be placed in responsive and responsible hands.

We strongly urge that the Illinois Pollution Control Board recommend that the O'Hare International Airport be placed under the supervision of a State port authority.

Congress has seen to the good of the people, for their protection, by passing laws such as Truth in Packaging and Truth in Lending. We firmly believe that the Illinois Pollution Control Board is dutybound to recommend that suitable and proper legislation be enacted to guarantee similar protection for citizens wishing to live or build in areas contingent and adjacent to airports. We suggest the following concepts:

1. A Truth in Airport Area Real Estate Act.
2. A Truth in Airport Expansion Act.
3. A Truth in Assessed Valuation of Homes in Noise Impact Areas Act.

A copy of this communication is being sent to the Honorable Governor Richard B. Ogilvie for his study and understanding, together with a request for a meeting to discuss proposals or other matters for the development of a statewide airport policy. We must look to the State, at this most critical time, to provide some degree of aircraft noise relief while permanent solutions are being developed.

Sincerely,
George J. Franks, *Chairman/President.*
O'Hare Area Noise Abatement Council.
R. C. Blomberg, *Director.*
T. Deka, *Director.*

Carbon copies: Richard B. Ogilvie, Governor of the State of Illinois; State Senators—Districts 2, 3, 4, 5, 15, 16, 39; State Representatives—Districts 2, 3, 4, 5, 15, 16, 37; Charles H. Percy, Senator; Adlai E. Stevenson III, Senate Office.

Back on May 15, 1971, I wrote a letter to the O'Hare Area Noise Abatement Council, and I introduced the action that they should take to encourage and promote Senator Cranston's bill, of California, the retrofit bill, and that information reads as follows:

May 15, 1971.

To All Members:

The O'Hare Area Noise Abatement Council, along with many cities and organizations across the country have expressed our support for a quiet engine retrofit program to reduce noise. Our group, OANAC, particularly made it an issue in a meeting held August 17, 1970, with Congressmen Collier, Crane, Erlenborn, and Pucinski. At that meeting we proposed nine needs to relieve our grievances which were acknowledged in a joint statement by the four Congressmen in a news release dated September 29, 1970. For reference sake I will list needs 6, 7, and 8 from our list, that are most affected at this moment:

6. Establish acceptable Federal commercial aircraft noise standards.
7. Provide funding for modification of existing engines, for noise reduction to conform to noise standards.
8. Allocate SST funds to engine noise reduction retrofit costs.

Senator Cranston of California has introduced a bill which would accomplish this, designated as S. 1566. A copy of this bill is enclosed for your study. A "Summary of S. 1566" is also enclosed for easy reading. Congressman Wilson of California has introduced a companion bill designated H.R. 7523 in the House of Representatives. We must concentrate action immediately to assure passage of these bills. The Federal Aviation Administration has never made it clear that it intends to proceed with a quiet engine retrofit program. We need a congressional mandate requiring that aircraft engines be made quieter.

If we act aggressively, this legislation can pass. We need to program ourselves as we did in blocking the transfer of 365 acres of land to the city of Chicago. We must proceed with:

1. Letter to your Senators, endorsing passage of the bill.
2. Letters to your Congressman.
3. Notify other cities, organizations, or individuals, and urge them to write to their Senators and Congressman.
4. Urge others to write to others.
5. Send a resolution from your municipality to your U.S. Senator and your District Congressman (a sample copy is enclosed for suggestions). Please send a copy of your resolution to OANAC for record and ready reference.

Through our endeavors to date, we have made some progress. By keeping up the pressure at this crucial time, we can realize a good measure of success.

The above is the first of our summer action for aircraft noise relief. The Congress has seen to the good of the people, for their protection by passing laws such as Truth in Packaging and Truth in Lending. We firmly believe that the Congress is duty bound to pass suitable and proper legislation to guaranty similar protection for citizens wishing to live or build in areas contingent and adjacent to airports, throughout the country.

The second phase of our summer action, again for the good of the people, is to petition for a Senate hearing or congressional hearing, to request the following legislation:

1. A Truth in Airport Expansion Act.
2. A Truth in Airport Area Real Estate Act.
3. A Truth in Assessed Valuation Act (of homes in noise impact areas).

Mr. Citizen has the right to know, not guess, what he is getting into when relocation of home is desired, and feel secure that the facts have been fully projected.

More details on this will follow as the program progresses.

Sincerely submitted.

George J. Franks,
Chairman, O'Hare Area Noise Abatement Council.
Richard C. Blomberg,
Vice Chairman.
T. E. Deka,
Vice Chairman.

S. 1566

A BILL TO amend the Federal Aviation Act of 1958 in order to provide for more effective control of aircraft noise. Introduced by Senator Cranston, April 1971.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That Section 611 of the Federal Aviation Act of 1958, relating to the control and abatement of aircraft noise and sonic boom, is amended by inserting at the end thereof the following:

"(d) Effective on and after January 1, 1976, all Subsonic Transport Category aircraft operating within the jurisdiction of the United States shall reduce their takeoff, approach and sideline noise each by 10 EPNdB from their 1971 noise levels or to the levels as set forth in Appendix C (not including section C36.5(c)), 14 C.F.R. chapter 1, part 36, and as prescribed in Docket No. 9337, 34 F.R. 18364, November 18, 1969, and amended by amendment 36–1, 34 F.R. 18815, November 25, 1969; 34 F.R. 19025, November 29, 1969, whichever noise reduction is greater. No airplane shall operate in violation of the prescribed noise levels.

"(e) (1) The Administrator shall undertake by contract on immediate program of research on representative aircraft models prior to January 1, 1974, to demonstrate compliance by prototype flight test with subsection (d) of this section. Such contracts may be entered into without regard to sections 3648 and 3709 of the Revised Statutes (31 U.S.C. 529 and 41 U.S.C. 5), and shall provide that each contractor shall repay the amount of the research and development grants if the sound reduction devices developed pursuant to those grants are sold commercially. Such payments shall be covered into the treasury as miscellaneous receipts.

(2) There is authorized to be appropriated $35 million to carry out the provisions of this subsection.

(3) The findings of all research and development grants made pursuant to this section shall be made available to foreign aircraft corporations which produce or have produced aircraft covered by the noise standards of subsection (d) of this section.

"(f) (1) The Administrator may, upon terms and conditions prescribed by him, guarantee in whole or in part the repayment of any loan or other form of financing made to an air carrier for the purpose of modifying airplanes prior to January 1, 1976, to meet the requirements of subsection (d). The total amount guaranteed pursuant to this subsection shall not exceed $1 billion.

(2) No guaranty shall be made under this subsection—

"(A) Unless the Administrator finds that without such guaranty, in the amount thereof, the carrier would be unable to obtain necessary funds, on reasonable terms, for the purposes for which the financing is sought;

"(B) If in the judgment of the Administrator the financing involved is at a rate of interest which is unreasonably high;

"(C) If the terms of such financing permit full repayment more than fifteen years after the date thereof; or

"(D) Unless the Administrator finds that the prospective earning power of the applicant carrier, together with the character and value of the security pledged, if any, furnish reasonable assurance of the applicant's ability to repay the financing within the time fixed therefor and reasonable protection to the United States.

"A statement of the findings of the Administrator required under the provisions of this subsection shall be made a matter of public record by the Administrator with respect to each guaranty under the provisions of this subsection.

"(3) The Administrator may consent to the modification of the provisions as to rate of interest, time of payment of interest or principal, security, if any, or other terms and conditions of any guaranty which it shall have entered into pursuant to this subsection, or the renewal or extension of any such guaranty, whenever the Administrator shall determine it to be equitable to do so.

"(4) Payments required to be made as a consequence of any guaranty by the Administrator made under this subsection shall be made by the

Secretary of the Treasury from funds hereby authorized to be appropriated in such amounts as may be necessary for the purpose of carrying out the provisions of this subsection.

"(5) In the event of any default on any such guaranteed financing, and payment in accordance with the guaranty by the United States, the Attorney General shall take such action as may be appropriate to recover the amount of such payments, with interest, from the defaulting carrier, carriers, or other persons liable therefor.

"(6) The Administrator shall prescribe and collect a guaranty fee in connection with each guaranty under this subsection. Such fees shall not exceed such amounts as the Administrator estimates to be necessary to cover the administrative costs of carrying out the provisions of this subsection. Sums realized from such fees shall be deposited in the Treasury as miscellaneous receipts.

"(g) The Civil Aeronautics Board shall not reject any increase in rates, fares, or charges filed by an air carrier pursuant to section 403 of this Act if such carrier files with the tariff showing such increase adequate proof that such increase is due to costs of complying with subsection (d) of this section. Such cost shall include both the cost of retrofitting aircraft with sound reduction devices and the early retirement of aircraft due to implementation of the standards imposed by this Act.

"(h) (1) The Administrator is authorized to make grants to State and local agencies, subject to such terms and conditions as he may determine appropriate for the purposes of this section, to assist in paying the cost of administering airport noise monitoring programs.

"(2) Not more than 15 percentum of the funds appropriated pursuant to this section in any fiscal year may be granted to agencies in any one State.

"(3) For the purpose of this subsection the term 'State' includes the Commonwealth of Puerto Rico, the Virgin Islands, and Guam.

"(4) There is authorized to be appropriated not to exceed $50 million to carry out the provisions of this subsection."

SUMMARY OF SB 1566

INTRODUCED BY SENATOR CRANSTON OF CALIFORNIA

A BILL TO PROVIDE FOR MORE EFFECTIVE CONTROL OF AIRCRAFT NOISE

Requires that engine noise on all subsonic transport category aircraft be reduced by 10 EPNdB or to the levels of Part 36 of the Federal Aviation Regulations, whichever is greater, by January 1, 1976.

Requires that aircraft conform to these lower noise levels during actual operations at airports.

Provides funding of $35 million for research and prototype flight testing to demonstrate compliance with the required noise levels. Any contractor who sells retrofit kits based on such government funded research will be required to repay the grant as a percentage of his profits on kits sold.

Provides that the Administrator of the FAA may guarantee loans made to an air carrier for the purpose of modifying airplanes up to a maximum of $1 billion.

Provides that the Civil Aeronautics Board shall not reject any reasonable increase in fares required by an air carrier to cover the costs of complying with the noise limits. (Senator Cranston estimates the required fare increase to be less than 1.5 percent.)

Provides Federal grants not to exceed $50 million to assist in paying the cost to State and local agencies of administering airport noise monitoring programs.

In Addition, Senator Cranston and the Aerospace Industries Association estimate that 35,000 people would be employed in the aerospace industry as a direct result of this program. They estimate that these jobs would generate still another 105,000 jobs outside the aerospace industry.

RESOLUTION NO. 6305

A resolution of the city council of the city of Inglewood, Calif., relating to aircraft noise.

Whereas, two-thirds of the city of Inglewood is plagued by unacceptable aircraft noise; and

Whereas, technology is available to reduce aircraft noise by 50 percent (10 EPNdB); and

Whereas, the cost of reducing aircraft noise pollution should by right be borne by airline passengers and amounts to a required fare increase of less than 1.5 percent; and

Whereas, present Federal Aviation Administration Regulations do not apply to noise from existing jet aircraft, and in all probability these aircraft will be in service for another 10 to 15 years; and

Whereas, existing Federal Aviation Regulations do not limit the noise which may be created at airports during actual operations;

Now, Therefore, Be It Resolved, that the City Council of the City of Inglewood, California, does hereby endorse the legislation introduced by Senator Cranston requiring retrofitting of engines to suppress the noise on present jet transport aircraft as legislation which would be of incalculable benefit to millions of citizens adversely affected by aircraft noise in the United States.

Passed, approved and adopted this 13th day of April, 1971.

WILLIAM COEDIKE,
Mayor of the City of Inglewood, Calif.
HELEN RIECK,
City Clerk

We can't afford to stop, because when we go home we will have the noise. When we go to sleep we will have the noise; we will have it all night, we will have it tomorrow. We just can't stop.

Here is a letter written to Mr. Ogilvie, Governor Ogilvie. I introduce myself—the letter reads as follows:

JULY 1, 1971.

HON. RICHARD B. OGILVIE,
207 State House,
Springfield, Ill.

I am writing to you as President of the O'Hare Area Noise Abatement Council (OANAC), an organization representing some 31 communities with a total population of 1.5 million people bordering O'Hare International Airport, and all dedicated to reduce the severe noise problem caused by jet aircraft. Members of OANAC were appointed by the local governing bodies, thru resolution, vote, and due process. We are a respectable, responsible organization, and are attempting to accomplish our aims using the democratic process and through our elected representatives.

To that end we write this letter and respectfully solicit your support.

Specifically, we of OANAC wish to establish a meeting with yourself and/or with whomever you may delegate so that we may sit together in council, and develop a plan whereby we can get some immediate aircraft noise relief, which we so desperately desire. As referenced in my letter to the Illinois Pollution Control Board, I am inclosing a copy of that letter and request this most valued meeting. Would you kindly arrange and advise, so that we may look to an enlightened future.

Very truly yours,

GEORGE J. FRANKS,
President.
R. C. BLOMBERG,
Director.
T. DEKA,
Director.

I did get an answer to this very recently—and recently meaning like yesterday or the day before—and I have no comment yet, but he did turn it over, like we expected, to a personable man, a task force on noise pollution, and he will meet with us, so I explained what we were going to do here today and asked him to put it off until next week. I will be in a better position to give him more time. We still can't stop, we still have the noise, so we appeal—we appealed, on July 21—and that just went out prior to my even knowing about this meeting, that I wrote to the presidents of Allegheny Airlines; American Airlines, Inc.; Braniff International; Continental Airlines; Delta Airlines, Inc.; Eastern Airlines; North Central Airlines, Inc.; Northwest Orient Airlines,

Inc.; Ozark Airlines, Inc.; Pan American Airways; Trans World Airlines, Inc.; and United Airlines, I think 12 or 13 basically listed here, and I think this will sum up the attitude of how the people out here feel:

JULY 21, 1971.

SIR: I am writing as president of the O'Hare Area Noise Abatement Council (OANAC), an organization representing some 31 communities adjacent to and surrounding O'Hare International Airport, dedicated to combat the serious severe noise problem created by jet aircraft. Members of OANAC were appointed by the local governing bodies, thru resolution, vote and due process. We are a respectable, responsible organization, and with that attitude as our guiding principle we are attempting to get some aircraft noise relief immediately. We say immediately, bearing in mind that we believe that certainly there are long-range programs for future noise suppression, but we desperately need an interim solution.

But where do we go?

We have met with the FAA representatives, and their Airport Noise Abatement Committee, the Illinois attorney general and the president of ALPA with Congressman Erlenborn in a Bensenville meeting. We have gone to Los Angeles and to Washington, D.C. We have met with our four Congressmen separately and then collectively with the mayors and presidents of the surrounding municipalities. We have met with the Senators of Illinois. We have met with our own State legislators, as well as many others and many other meetings. We have petitioned to the President of the United States. We have thousands of signatures to prove our need for help.

But what has it gotten us?

And now, where do we go?

To the answers to these questions we write this letter and respectfully solicit your support.

We have never appealed to the airline owners directly, and perhaps we have been remiss. We are appealing now. We firmly believe that some jet aircraft noise relief can be realized now, and some areas totally relieved now, while long-range plans for permanent noise cures are developed and implemented. To accomplish this we need the full cooperation and understanding of the airlines themselves.

It is absolutely unreasonable for anyone to believe that, knowingly, the airlines would sacrifice the well being of so many people unrelated to the industry for the sake of expediency and economics. Business and profits are very important to the aircraft industry, everyone fully understands. But what accomplishment are these values when they are taken from others. What is left for any family, after losing the true value of their lives—peace and tranquility in their own home, any and all times, day or night, with no recourse. Would you not say futility and desperation can only set in. And is this not a sickness. Are not the Public Relations Departments concerned.

Specifically, we wish to point out the low altitude, dangerous short turns made by aircraft immediately after takeoff, to get "on course," apparently for economy.

The 747 type aircraft is truly an engineering masterpiece. Beautiful in every respect—appearance, majestic, quiet, and a real pleasure to watch. However, the longer they fly, the bolder they get, until they have almost offset the built-in engineering technological advances. Older types of aircraft noise is almost impossible to bear and some types such as the 707 and DC–8 are so noisy they should be retired. All are turning lower and lower, apparently depending on their destination, under full power making life for people in these areas unbearable. We are not relating to a few people rather, we are relating to hundreds of thousands. Although not the product, the residents on the ground should get the same considerate attention.

Understanding noise is not enough to properly put it in perspective. One must experience the aggravation and pain of noise to realize the plight of the resident citizen. We, of OANAC, humbly submit that the airline owners or principals have never been subjected to this constant, rhythmatic noise condition.

The executive committee of the O'Hare Area Noise Abatement Council respectfully extend an invitation to yourselves and to any committee you may choose to meet with us, to listen to, and to experience the noise problem directly with us as outlined above. Then we can all converse on common ground, and we can better get some help through experience—not just understanding. We have some suggestions we wish to propose.

We further commit ourselves to meet with your representatives along with ALPA, FAA, PATCO, CAB, and any other department apropos to the subject, either in single conferences or in a group conference. Should it be your desire, we can arrange to have the mayors and presidents represent their respective municipalities. We are sincere, and solicit your complete cooperation and subsequent support.

We are in no position to judge the mood of the aircraft industry regarding Senator Alan Cranston's bill to retrofit all existing jet aircraft engines with noise suppression devices, but we will energetically solicit their support for the bill. With the full weight of the aircraft industry behind this bill and the powerful influence they have on the Congress, passage of this bill can be assured. Senator Alan Cranston in his presentation of the bill said, "Under FAA noise standards, my bill would improve noise conditions from unacceptable to acceptable for 340,000 people in Chicago." The O'Hare Area Noise Abatement Council wishes to discuss a program to relieve this vast number of citizens so adversely affected by jet aircraft noise.

It is our intention to review with your committee the standard takeoff profile agreed upon by FAA, ALPA, and ATA in 1968, resulting from experimental noise abatement tests conducted at Wallops Island, Va. in 1967 by NASA using various airline aircraft. This procedure would offer some measure of noise relief, and every effort should be made to implement the plan throughout.

The O'Hare Area Noise Abatement Council also wishes to discuss among other things, methods to help residents hopelessly buried in jet aircraft noise in Fairview Heights, Schiller Park, due to the use of runway 9R.

Money is no problem. We buy our pleasures. How do we buy peace and quiet?

May we look forward to a very early favorable reply, at which time we can arrange the details for a fruitful meeting.

Very truly yours,

GEORGE J. FRANKS,
President, Executive Committee.
RICHARD C. BLOMBERG,
Leyden Township, Ill.—OANAC Director.
TERRENCE DEKA,
Wood Dale, Ill.—OANAC Director.
ALBERT H. CASTLE,
Des Plaines, Ill.—OANAC.
GERALD T. ROHRER,
Park Ridge, Ill.—OANAC.

I would like to interject by saying that we do listen to the experts; we do listen to the physicists and the design developers; we are talking 3 to 5 years. Senator Alan Cranston is talking about the retrofit program finishing by 1976. We heartily endorse his program, but what do we do in the meantime? There is tomorrow, there is today, there is tonight, next week, and this is what our request is, something should be done, and our appeal is directed to the airlines because we really think they don't know.

When we look at these low turns—which I will clear up a little later—when they are hardly airborne, and they make a turn, I don't know, it was said on the panel, or one of the witnesses, it was either today or yesterday—I was here both days—they said that the low turn is to relieve noise. Well, they are only spreading the noise. You just have so much noise to spread, and they spread it where they think it's the best. If they hammer one village all the time they are going to have a riot, but if they give everyone a little bit, by the time it comes back, it's cooled off. Now, it happened so often that the interims have gotten closer together. It's like the dripping water and the Chinese torture, and every plane now is worse than it ever was, because our thinking has been different.

I have tried to illustrate to you gentlemen every avenue that we have experimented with.

Dr. MEYER. Have you had any answers to that letter yet?

Mr. FRANKS. The July 21 letter? I have not.

Dr. **MEYER**. It's a bit early.

Mr. **FRANKS**. Now, I would ask—I would ask you people what do we, as representatives in our own way—and since we are not paid, we probably take a bigger beating, I am not sure, but they call us hopeless—hopefully they have someone to turn to—Mr. Franks, do you know this? Do you know that? Yes. I am going crazy, and if I don't hurry up and get something done for my own good, I am going to go out of business because I haven't got that much time to handle that, really.

When we talk to the Federal Aviation Administration, which we did, and I have another letter which I will not go into, but we made our full circle. We started with the Federal Aviation Administration, and got nowhere, and tried all these other tangents, and every letter—for example, the letter to the President, and all the people that were on the mailing list, I think this is a very important part of the testimony, it was sent to the Honorable John M. Mitchell, Melvin Laird, and I guess without disrespect, I will leave the titles out, Senator Percy, Senator Smith at that time; Governor Ogilvie; Mr. Scott, the Attorney General; the Congressmen Collier, Crane, Erlenborn, and Pucinski, along with the letter to the President of the United States.

All of these men, in the answers—they did answer, the congressmen were terrific, and we are very grateful for that, because they got us up to this point. I think they kept us alive, but all the letters were referred to the FAA, and I just rather drop it there, because I might get sarcastic and have to explain some wild remarks.

Nothing has happened. The greatest thing that has happened to our group, as we see it now, is this hearing. May we look forward to some results, good results, before I don't know what is going to happen now. We don't want to move out of our homes. I think we made that clear. We liked it there. We picked it there. We will not move, and who is private enterprise to walk in and say, "Get out, we are taking it."

We are just not going to do it, and I would like to make one parting statement, that if they doubt that we are united, that we are together, when we have our next meeting we will tell them they will probably be on the runway, but we will run out the due process right to the ground before our patience runs out. Thank you very much.

Dr. **MEYER**. I appreciate it. Would you mind waiting a minute, in case the panel has a question? Also I know from our agenda that we have some people who have traveled long distances to come here. This is a national meeting, not a Chicago meeting. Some of these people may have trains to catch and get back—trains or planes or buses or cars—see, I am thinking ahead, friends. You talk about mass transit. I am thinking about not only airplanes, but urban mass transit and intercity transit systems for the present and the future.

I understand that Alderman Singer was going to make a comment. After that I think I better see if I can find the people who are from such places as Minneapolis and take care of them, because I don't think the citizens of Chicago, who are still here, would feel we were being necessarily hospitable if I didn't take that factor into account. But I would like to ask the panel, though, if they have any questions. I am sure, after this very explicit and forthright statement, that some of my colleagues may want to ask you a question or two, sir, if you don't mind.

Professor Plager. I would like to ask a question. Mr. Franks, it is a pleasure to have you before us, and to hear your statement. I have assessed from what you have said that this is a kind of a grass roots citizens' expression of concern—the kind of expression of concern I think that may really begin to indicate the need for some real action and real changes. Let's explore that just a moment with you. Is your group largely a group of homeowners? Is that a fair statement, people living in the area?

Mr. Franks. They are.

Professor Plager. They are?

Mr. Franks. Yes; they are only in the area.

Professor Plager. Only in the area?

Mr. Franks. Yes.

Professor Plager. Recognizing that kind of citizens group such as yours, obviously has to have a corps of active people. Roughly how many people would you say, or how many homeowners, how large a group do you think you can honestly speak for, that you are representing?

Mr. Franks. I think I am speaking for 19 municipalities legitimately, speaking for them; nine members are on my executive committee, of which seven are very active.

Professor Plager. Now, are you—when you say that, I take it you are not speaking so much for the Government as you are for the people who are living in those municipalities,——

Mr. Franks. Yes.

Professor Plager. Is that correct?

Mr. Franks. For the people, as long as I represent them with a little show of dignity, perhaps mixed with anger, the governments will continue to approve my doing it.

Professor Plager. That mixture can be very useful.

Mr. Franks. Yes.

Professor Plager. I sense that people are angry, and perhaps properly so.

May I ask what your business is, Mr. Franks?

Mr. Franks. I am in the manufacturing business. I will, no doubt, be hit by this ordinance—well, I am not in Chicago. I am in Cook County, but if it goes Cook Countywide, I will be attacked for noise in my own plant, and I can't do anything with the man who is keeping me awake day and night.

Professor Plager. But you are willing to do your share as long as something is done about those who apparently aren't; is that what you are saying?

Mr. Franks. I will do my share without any law, now that I understand—and I have, for awhile, I have automatic screw machines. We turn steel from the bar. It's about the noisiest stage you can get running full speed—law or otherwise, I would do it out of my good nature.

Professor Plager. All right. Now, there are a lot of questions I would like to ask you, but I know we have to move on. Let me put one final question to you: I sense from your statement and your experience that you haven't really had a very satisfactory experience in dealing with the various agencies, both of local, State and Federal government with all of this. I know our chairman, Dr. Meyer, has a very sincere concern with this, and hopefully the EPA will be able to come to grips with this problem—although, of course, there are a number of other agencies that are intimately involved. Let me ask you a hypothetical problem: If we fail, if we cannot solve the problem expeditiously and effectively, what then?

Mr. FRANKS. Immediately upon you saying that, I got a terrible sinking feeling—I am going to tell you, if you feel we are not going to be too responsible, where do you go now?

Now, how hard would you fight for your home? Did you serve in any of the wars? Whose home are you fighting for? Then you let private enterprise come in and take it out from under your nose.

Now, if I lost my home on account of payments and, you know, these people are working hard, a lot of these people who live in this affluent suburbia can't afford it, this country is the only country in the world where people can afford to live beyond their means, you know that, so they got two jobs, they got a part-time job, two jobs and a part-time job, and I just gave my men in my plant, I got three corporations, and I gave them a choice—work 10 hours a day, get your 40 hours a week and take a part-time job on the side. They are grateful no end. I mean, what is so difficult about that?

If we say that the aircraft are bothering us to that extent, what is so difficult about coming out and seeing what is bothering us? Why do they make these short turns? I really would make one of the demands of this group here to say that the airlines have a noise standard to meet, get your experts out of the homes, out at the homes and meet them.

Professor PLAGER. In other words——

Mr. FRANKS. Don't expect us to come up with the answers. We are citizens. We don't know, and experts disagree and argue. They have the answers. They have got them someplace, just open the drawer and get those experts out. It should come out of this group, I think, to say, "Here are the noise standards of the airports; meet them or else."

Professor PLAGER. In other words, we can't afford to fail, can we?

Mr. FRANKS. You can't what?

Professor PLAGER. We can't afford to fail, can we?

Mr. FRANKS. No, no. Really you can't. Don't put that burden on us. We are trying to be nice people. We have been patient for 2 years, and you know the American characteristic is the same; we are big dummies. You travel abroad—in Mexico I asked a citizen out there, "What do you think of the Americans?" He said, "They are big goofs, big goofs, but don't get them mad."

Now, see if that isn't our way. We sit at conference tables for years, but when our temper changes—the bombs. There is no in between, and I guess we are typical Americans. We are probably the greatest cross section of American citizens you will find in this country.

We have—this is well-to-do suburbia; they are paying their taxes; they are law abiding citizens; they are towing the mark. Now, what more can you ask of them? All we are asking is leave us alone—no higher pay, no better schools, no more schools, no more roads, no discrimination, no ADC aid. They are asking for nothing, just leave us alone. Now, how difficult is that request?

Professor **Plager**. Thank you, Mr. Franks.

Mr. **Franks**. Thanks.

Mr. **Hinton**. Mr. Chairman, may I ask just two very quick questions?

Dr. **Meyer**. Yes, indeed. We are going to have to push ahead, though, or we are not going to hear all the people entitled to have their say. But I am determined that everyone who wants to speak has an opportunity to do so.

Mr. **Hinton**. Mr. Franks, "yes," or "no," do you know whether or not procedures, noise abatement procedures are in effect at O'Hare? "Yes" or "no"?

Mr. **Franks**. Effective noise procedures, no.

Mr. **Hinton**. OK. Do you know—you said that certain airlines responded to your letters to the chief officers of the companies, you said, and you specified some cooperated. Now——

Mr. **Franks**. No; I am asking for their cooperation. I have had no response. I am asking for the cooperation. I want them to cooperate and meet with us and talk with us. No answer yet. It was dated the 21st.

Mr. **Hinton**. Thank you very much.

Dr. **Meyer**. Professor Kerrebrock.

Professor **Kerrebrock**. Mr. Franks, we are in a very formative stage in the reduction of aircraft noise. You probably understand this.

Mr. **Franks**. Yes.

Professor **Kerrebrock**. That we have gone in the last 2 or 3 years from essentially a minimum of regulation to now a stage where the Government is beginning to think very seriously about this, and I think it's extremely important that in this formative stage we collect information from people such as you, who have the real experience as to what is acceptable. Now, you made a statement that you would like to see the noise exposure limited to that which would be, which would result from 100 flights an hour, or per pre East-West runway. Do you think if the noise exposure could be rolled back to that level that the population around O'Hare would be willing to wait for improvements in the future, or would there be almost as much concern as there is now?

Mr. **Franks**. I would have to use my judgment on that and I would say that we may show a little patience—something is being done right now, we are getting, may I say, lip service. We are just tired of going from meeting to meeting, and after each meeting there is a 6-month delay.

Professor **Kerrebrock**. You want to see progress.

Mr. **Franks**. I want to see progress, but they are just buying time that we haven't got to give.

Professor **Kerrebrock**. What about leveling off at the present level of exposure?

Mr. **Franks**. That is totally unacceptable.

Professor **Kerrebrock**. That is too high?

Mr. **Franks**. Totally. There are too many people involved. In the articles I submitted I showed you a letter, the suburbs of Franklin Park-Schiller Park-Stone Park, we sincerely believe that a close study of flight patterns, and perhaps, I am not even saying "perhaps," but we don't have that time, money or the expertise to look into it, but we think they can get these flights off in a more orderly manner—maybe just as many flights.

We have open areas they can use, 27L to give you one example, they get airborne, turn left real quickly, and Bensenville and Wood Dale gets swamped, and our little town gets swamped with noise.

Now, if they travel straight out they would get into Itasca, but if you calculate the footage and the height, the rate of climb by using this experiment at Wallops Island, they will be at an altitude where noise would be acceptable, and I would also say that noise to our punished and painful ears will not be as loud to some at 75 or 80 decibels as it is, because we are accustomed, on my very patio, and I had the note, but I skipped over it, I had five officials from the Federal Aviation Administration—which I can verify—substantiate, and one of them was the electronics engineer with their sound equipment. This is a back patio of my home, and you have got to see my home to appreciate what I am talking about—it's a beautiful, wooded area——

Professor **Kerrebrock**. Yes, I understand your problem——

Mr. **Franks**. One hundred seventeen decibels there—it was a reading of 117 decibels. That means 1 foot apart you cannot hear a conversation——

Professor **Kerrebrock**. I would like to——

Mr. **Franks**. Mouth-to-mouth conversation.

Professor **Kerrebrock**. I would like to suggest, if I may——

Mr. **Franks**. Yes.

Professor **Kerrebrock**. That it would be very helpful if you would attempt to gather this information and convey it to this panel as to at what date in the development of O'Hare Airport the noise level became truly unacceptable.

Dr. **Meyer**. That would be very useful.

Mr. **Franks**. All right.

Dr. **Meyer**. At what date——

Professor **Kerrebrock**. Could you do that?

Dr. **Meyer**. Did your group really feel that it really had to begin? I think this would be most useful to us. I am not saying that is the point you necessarily would cut back, but it gives you some technical data as to group reactions; that would help us a great deal, it really would, sir.

Mr. **Franks**. We will be happy to do that. I would like to leave you with one parting shot; please give us something in the interim——

Dr. **Meyer**. We will try.

Mr. **Franks**. Because every day is too long.

Dr. **Meyer**. Thank you.

Mr. **Franks**. Thank you.

Dr. **Meyer**. Thank you very much, sir. Is Alderman Singer here?

Alderman **Singer**. Yes.

Dr. **Meyer**. Alderman, nice to have you. Welcome to this group.

Alderman **Singer**. Thank you very much.

STATEMENT OF WILLIAM SINGER, ALDERMAN, CITY OF CHICAGO

Alderman **Singer**. Mr. Chairman, before I begin my presentation, I just want to say that I will try to be brief and confine my remarks to two specific areas, where I think that a local official can relate to a Federal panel such as yours.

Dr. **Meyer.** Very good, sir.

Alderman **Singer.** Mr. Chairman and members of the panel, I appreciate this opportunity to testify before you today. I am pleased that your Agency is conducting these hearings throughout the country in order to determine the extent of support for noise abatement procedures, the practicability of such procedures, and most importantly, the necessity for such procedures.

I am not an expert, either in the medical or technical aspect of noise control, but as a locally elected official I have devoted considerable time to understanding the problems of noise pollution. I would like to briefly discuss some local concerns which clearly have a relationship to the Federal Government.

As you know, Chicago has recently passed a new and, I think quite strong noise ordinance.

I am a member of the committee of Environmental Control of the city of Chicago; it was passed after extensive studies and hearings, and for the most part is a major step forward toward reducing noise levels in Chicago. Nevertheless, there are unregulated sources of noise that remain, the two most important of which are noise from rail and noise from air sources.

The Chicago Transit Authority indicated that they could not comply with noise abatement requirements and, therefore, were exempted from the city's recently passed ordinance.

While I recognize that there is an enormous expense in equipping old mass transit vehicles, and even new vehicles in a way so as to reduce the noise emanating therefrom, the absence of any program—I stress that, the absence of any program now, or in the future, to cope with this problem is more disturbing than the authority's request to be excluded from coverage of the present ordinance.

I am encouraged that Mr. Cafferty, the new chairman of the CTA has indicated a desire to study this problem. I would suggest, however, that there is a clear Federal role with respect to noise abatement for federally financed mass transit facilities.

Specifically I would suggest that in the future all mass transit funding be contingent, first upon a comprehensive plan of the receiving authority for noise abatement. This plan must take into account both existing equipment and future equipment.

Perhaps funding of new equipment should be limited to equipment which would meet federally imposed standards; should there be a determination that its use in urban areas would, as a result of the sound emanating therefrom, have an adverse environmental impact—in any event, the environmental impact statement from proper Federal officials should also be a condition precedent to Federal funding.

I want to stress that these last points relative to Federal funding of mass transit are suggestions for you and the Congress to consider. I put them forth in the hope that they will spur a requirement and an incentive for planning by local mass transit authorities.

The other problem where there is a clear Federal role relates to the noise from aircraft. We have already devoted a considerable amount of time to that.

The city refused to limit the hours of takeoffs and landings at O'Hare International Airport—now, I parenthetically would say I made those suggestions to the committee. I think they were rejected; Congressman Pucinski, who has been involved in this problem for a long time also suggested that they not agree to limiting landings and takeoffs—a suggestion with which I do not agree, obviously.

Chicago newspapers have carried reports in the last few days for recommendations ranging from clearance to compensation payments for staying in areas near airports. While I do not profess to have the long-range answer to this problem, short of locating new airports a sufficient distance away from residential areas, some forms of traffic regulation, even as an interim measure —and I would add parenthetically that even if all of Congressman Pucinski's suggestions were adopted by the Congress tomorrow, even he said 5 years would be the earliest possible time for total compliance, so even as an interim measure, traffic regulation would seem desirable to protect those people whose residences are in flight paths of our major airports.

This could involve limiting the hours, or reducing the traffic loads at certain hours, or restricting the use of certain runways as a condition to continued Federal funding of airport facilities, and just as in the case of funding mass transit facilities, you do fund, and the city council approves the receipt of grants from the Federal Government for such things as runways, control towers, et cetera.

I would again suggest the requirement of an environmental impact statement from the Federal officials, and also the requirement that at the local level there be a plan for noise abatement relative to surrounding areas.

Therefore I have really suggested in both of these, mass transit and airport, two specific areas for your consideration: One is the requirement at the local level that there be a comprehensive plan, and the other is the requirement at the Federal level that there be an environmental impact analysis. I don't think that this is too harsh a measure to impose on the local authorities.

You may ask whether this is the carrot or the stick, and I would say it's something of both. I think there has to be somewhat of a stick over the heads of local government because it receives this great amount of money from Federal sources.

While, of course, there are other problems in the noise pollution field, many of these are local in nature, and I appreciate the opportunity to come in and comment on these two areas where I feel there is the necessity of action at the national level. Thank you, Mr. Chairman.

Dr. **MEYER**. Mr. Alderman, as a municipal official, I am impressed with your grasp of the relationship between the State and its political subdivisions and the political subdivisions with the Federal Government; and you have called our attention, rightly, to a need for greater use, or greater attention in the environmental impact statement process to some of these problems. The Environmental Protection Agency, and my portion of it, as well as other portions, are deeply involved in this now, as you know.

You raise the thought that by definition, perhaps, some of the grants and so on of the other agencies, such as airports and municipal transit authorities, will require even greater consideration in this area. And I have made a special note of this; we are reviewing that particular subject at this moment in the Agency.

The purpose of these hearings is to get new suggestions, and we appreciate that very much.

Alderman **SINGER**. Thank you.

Dr. **MEYER**. Panel.

Mr. **HINTON**. Alderman Singer, where is the 43d Ward?

Alderman **SINGER**. The 43d Ward is roughly 10 blocks north of here, 20 blocks north of here running up the lake front to approximately 3000 North, and running west about 1800 West.

Mr. **HINTON**. You made several statements about—I thought very responsible statements about the aircraft proportion of the noise problem that you have, and yet you are quite away from the airport, so your problem is nowhere near as close.

Alderman **SINGER**. Well, let me explain why, as in the case of Mr. Franks, there was, about 6 to 8 months ago, an incident of noise from airplanes coming in at relatively low levels, and again the explanation we received through Congressman Yates, through his office, as in the case of Mr. Franks, was that it was due to the construction of runways.

I got involved in the whole question of aircraft noise, and felt if it was this bad in our area, it must be worse in other parts of the city, and I am a member of the city council obviously concerned about the entire city.

Mr. **HINTON**. Well, Alderman Singer, do you know of any steps that have been taken at O'Hare that effectively reduce the noise exposure on the community?

Alderman **SINGER**. The only—there is only one that has been taken, and that is limiting the revving up of engines while on the ground.

Let me point this out, which I think is something you know why we have to discuss this between Federal and local agencies, there was a great deal of testimony by the city officials saying that the city could not control either the runway times, the amount of landings and takeoffs, or the use of any particular runway, or even shut down the airport entirely—even though we operate it.

I would tend to disagree, at least on the last opinion that we could have some authority over this, but there was the question of Federal preemption. The city, therefore, chose not to act in any of these areas, perhaps because of preemption problems, perhaps because of others, and therefore, I think it's appropriate to bring this before your body as the place to also consider these kinds of controls, but to my knowledge the only one the city has taken, or the airport authority has taken is to prohibit the revving up of engines while on the ground.

Mr. **HINTON**. Alderman Singer, one more question.

I notice you call for the requirement of the local noise abatement plan as a condition for receipt of funds for airport development.

Now, do you have any suggestions—would you think it would be appropriate for the city itself to initiate such a program, as the proprietor of O'Hare Airport, and, for example, the establishment of a noise abatement officer, and that sort of thing?

Alderman **SINGER**. Yes; I think it would be entirely appropriate for the city to do so. What I have suggested to you gentlemen is that the carrot of Federal funds may be an incentive to create that office. The city may feel that the Federal funds may be with-held, or may not be coming in the amounts that they would like, but this office might help them. I think, yes, the answer would be it would be our responsibility to do so.

Mr. **HINTON**. I would like to see that happen.

Professor **PLAGER**. Alderman Singer, let's assume just for the moment that it can be shown there are—that it could be shown there are certain operational practices that are within the realm of the management of O'Hare, the airport proprietor, which would have a significant impact on noise from its airport operation; would you be in favor of the city doing its maximum, or the airport proprietor—be it the city or otherwise—doing what it possibly could in terms of operational activities and procedures to minimize noise?

Alderman **SINGER**. Making the assumption that the city of Chicago, and through its control of O'Hare Airport, has the authority to, let's say, close the airport certain hours, or do other things.

Professor **PLAGER**. Take other operational steps, yes, sir.

Alderman **SINGER**. Yes, I think to the extent we would have to have a greater study of the economic impact, as well as the environmental impact, but I would say yes, in certain instances, as a general principle, I would be in favor of the city exercising that authority, if it could, if it was necessary, and I think the demonstration is that it is necessary to improve the environment for those people living around O'Hare. Now, which ones and how stringent you get I think depends on the economic consequences of such things.

Congressman Pucinski, for example, told us that the amount of freight which comes in at night would be severely restricted if you try to confine it to the daytime hours, and he couldn't have O'Hare be the center of commerce, commercial aircraft transportation, not passenger, but freight aircraft, so I think there are certain conditions that we would want to—maybe we would only restrict certain runways at night as a compromise, but again I would be in favor of exercising that kind of authority.

Dr. **MEYER**. Go ahead.

Professor **PLAGER**. Certainly at least the examination by the airport proprietor.

Alderman **SINGER**. What disturbs me more than anything is the absence of any, at least apparent desire, maybe something covert I don't know about, but any apparent desire, in actual planning for this kind of eventuality, for this kind of program, there is no program.

Professor **PLAGER**. In the absence of an apparent desire on the part of airport proprietors generally—and you need not limit us to O'Hare—would you be in favor of either Federal or State governments requiring airport proprietors to examine these issues?

Alderman **SINGER**. Yes. I think that would be encompassed in the suggestion I have made, that as a condition precedent for Federal funding, that some sort of program analysis be adopted by the local authority.

Professor **PLAGER**. Thank you.

Mr. **MARTIN**. Alderman Singer, you indicated that you were involved in—I am going to digress from aircraft and go back to the surface vehicles, that you were involved in the establishment of this Chicago ordinance.

Alderman SINGER. Well, I am a member of the committee which passed it.

Mr. MARTIN. All right. Some testimony yesterday by the manufacturers indicated that because of certain technological things that haven't arrived yet, some of these future levels probably will be very difficult to attain, if attainable.

What would happen if these levels were not attained; at that point is it the intent to restrict the use, those vehicles from being used in the city of Chicago? The levels of penalty here are very low, and in all probability it's not going to deter people unless you eliminate the vehicle.

Alderman SINGER. Well, I am not fully cognizant of all of the technological steps that must be taken, whether they can or cannot be met.

As a matter of law, and as a legislator, I would like to suggest that it was the right course to establish a stiff standard early, and make every possible attempt without conceding at all the inability to meet that standard, make every possible attempt—every possible attempt to seek compliance.

I think legislators and others are reasonable people, and if you established a strict standard, and if that standard is a good base attempt to meet that standard, and simply proves impossible, I am not talking about difficult, I am saying impossible, without severe, almost impossible economic consequences and the like, if that is the case I am sure we would be reasonable enough to make extensions or other things, but I don't want to suggest for a moment that we are going to change our law today on the basis of what someone says is impossible for the next 4 years. I would suggest that in 4 years from now if we can determine that everything humanly possible was done, and they need another 6 months, of course, but that is the issue before us, and we passed our ordinance, it was to develop the stiffest possible requirements that seemed feasible at the time, and to date I have not seen any kind of evidence which says that given the time periods we have established, they cannot meet all the requirements.

Dr. MEYER. Alderman Singer, that last statement of yours was a very useful exposition on legislative philosophy, which will be duly noted. We have some of those same problems at the Federal level——

Alderman SINGER. I am sure you do.

Dr. MEYER. As some people are aware. We appreciate your testimony very much.

Alderman SINGER. Thank you very much, sir. Thank you.

Dr. MEYER. Might I inquire if Mr. Fred N. Tabak, supervisor of the 18th district, Milwaukee County, is here?

Mr. TABAK. Yes, sir.

Dr. MEYER. It's a pleasure to welcome you here, sir. I am glad to have another elected official with us.

Mr. TABAK. It's a pleasure to be here.

STATEMENT OF FRED N. TABAK, MILWAUKEE COUNTY SUPERVISOR

Mr. TABAK. For today's American urban dweller, "natural" sounds are almost as rare as the American bald eagle. Of all the sounds that incessantly assault our ears, few emanate from natural sources, with perhaps the exception of an occasional chirp of a bird, roll of thunder, or person chomping popcorn in front of you at the theater. For the inner city or ghetto dweller, natural noise is even rarer.

Although unnatural or human-produced noises are too numerous to cite, one source of excessive noise stands out as the most prevalent and most irritating for the urban dweller: vehicular surface traffic.

Presently, we have over 90 million vehicles on the roads of America, with 2.8 million being added each year, a growth rate three times greater than the national population increase.

Not only are each of these vehicles potential air polluters, but each increases the ambient (background) noise level of the urban dweller. Urban ambient noise now ranges from a 40-decibel low of early morning to an 80-decibel high during the noisiest time of day. The increased ambient noise level can be traced directly to increased traffic movements during peak periods of the day.

Milwaukee, like most large urban population areas, has the curse of concrete corridors of noise carriers, known as expressways, slicing in crisscross patterns throughout the city. Every urban area, like Milwaukee, is subject to a daily tide-like movement of automobiles, entering the high-density work areas together in the mornings, leaving for the low-density residential areas together in the evenings. It is hard to point out any urban expressway, including Milwaukee's proclaimed modern system, that is not congested at peak load times.

The number of vehicles is growing at a rate faster than the roadway network—traffic congestion cannot help but become progessively worse. Milwaukee has a peculiar aberration in that the city is absent of an alternative transportation system, with the exception of an antiquated privately-owned, noisy, diesel fume belching bus system.

Unlike most cities, where a person who says he drives an automobile into the downtown area is given a questionable look, Milwaukeeans have been conditioned to do quite the opposite. The Milwaukeean who does not drive into the downtown area is the exception and not the norm. What has been the response of transportation planners in my area to the increased influx of vehicle noise polluters? An alternative noiseless underground or monorail system? Of course not. According to their reasoning, since vehicular traffic is increasing, the best recourse is to build more expressways. And so they are. Presently under construction, and with great opposition, is another concrete monstrosity that will transverse directly through one of Milwaukee's most beautiful, and I might add most quiet, lakefront parks.

Not only is the construction of expressways uprooting great numbers of people, but it adds new sources of ambient noise over and above the normal ambient sound level. Perhaps the families that are uprooted and moved are more fortunate than those who remain and must contend with the vehicle roar of the adjacent expressway.

Three things will probably result to the homeowner with property adjacent to the expressway: First, there will be an immediate decrease in property value; second, the noise level will probably increase to irritating or intolerable levels; third, the property owner must spend money to acoustically shield his home, or move.

A case in point in the Milwaukee area is a family who owns property adjacent and only 40 feet from the nation's fifth heaviest traveled truck interchange, on the interstate system. The noise level had become so intolerable that the family turned to Milwaukee County for a solution. County highway officials took sound readings at the property and found a high average of 86 decibels, a level high enough to irritate and annoy. Inside the home, with the windows closed, the noise level reached 54 decibels, about the equivalent of an air conditioner constantly operating. Because of existing lack of precedence, Milwaukee County could not purchase the property, and offered only recognition and sympathy to the noise problem, hardly a solution.

Realistically, expressways and vehicles that travel on them, and the noise that emanates from the vehicles will not be entirely eliminated. And, all the homes that are too close to existing expressways, through poor planning, cannot be purchased and removed.

The obvious and most immediate area to attack is the source of noise, and that of the vehicle itself. Vehicle manufacturers have vigorously been working on solutions to air pollution, with some success, and have likewise attacked the noise problem. But, whom have they aimed noise reduction research towards? Not the person who lives adjacent to the roadway, but instead, at the driver and passengers of the vehicle.

Ford Motor Co. has proclaimed its autos as the quietest in the field. Quietest for whom, the driver, or the pedestrian who hears the roar of the engine without the soundproofing interior of the auto? The Ford Motor Co. has, according to recent figures, a noise vibration-harshness research team, whose job it is to cope with some 15,000 sound-producing components of a car. I question whether they are aiming their research at the noise recipients outside the vehicle.

General Motors alone has approximately 100 men assigned to its acoustic research team, which was until recently headed by David Apps, an international authority on automotive noise control. But, again, the quest seems to be to eliminate some of the sounds, insulate others, and convert the stubborn ones into pleasing sounds for the passenger. I repeat, where does that leave the noise recipients outside the vehicle?

Vehicle horns are yet another problem. The Chrysler Corp., for example, specifies an ear-shattering sound limit of at least 125 decibels measured 4 inches from the horn. I believe it is also Chrysler Corp. that has developed the highly gimmicky and commercial, and equally irritating beep beep of its Roadrunner model.

The problem of vehicular noise is not unsolvable for the urban dweller, if the problem is recognized by Federal, State, and local governments, in addition to the corporate manufacturers of the noise-producing vehicles.

Presently, one of the major problems confronting local government in attacking and legislating against excessive noise is the unclear and conflicting laws governing noise pollution on the State and Federal levels.

Hopefully, through conferences such as we are holding today, government on the Federal level will be able to offer clear guidance to the State and local governments on noise pollution. The Federal

Government offers the best potential in approaching vehicle manufacturers on noise pollution problems, as it did with air pollution.

On the State and local level, conflicting laws on noise pollution must be eliminated and a coherent policy formulated. For example, the State statutes of Wisconsin allow prosecution for excessive vehicle noise only if it is linked with the muffler, and smoke emission is evident. As a result, only 17 prosecutions in Milwaukee County were made under the law in the past year. Obviously, forceful and updated laws are needed for vigorous prosecution of noise polluters.

If, in fact, expressways continue to expand as they currently are, steps must be taken to alleviate the ambient roar that dissipates to surrounding dwellings. This can be accomplished through improved design and location of the roadways. Solutions include depressed road construction, the use of banking barriers or covering the surface with plastic materials that absorb tire noise. Immediate solutions, such as flanking barriers, need not be expensive or complicated. The simple planting of dense rows of trees or shrubs can reduce noise by about one decibel for every 4 feet of thickness, as well as cut off direct view of traffic and reduce the glare from automobile lights at night.

For the individual who lives adjacent to expressways and who is caught in the vise of excessive roadway noise through poor planning, there should be amenity grants. A precedent has already been set in this area where, in Britain, people who have been made to suffer from excessive noise, through no fault of their own, are government subsidized with half the cost of soundproofing the dwellings.

In conclusion, I recommend: One, guidance on the Federal level and legislation on the state and local level, coherent and consistent with limiting excessive noise on roadways; two, immediate investigation by vehicle manufacturers on the causes and solutions of excessive noise, not for the passengers of the vehicles, but for the recipients of the noise outside the vehicle; three, increased considerations of noise emissions in the building of future roadways, and amenity grants for people who own dwellings adjacent to excessively noisy roadways; and four, the development of long-range plans for the eventual phasing out of the current noisy vehicle and the replacement with alternative transportation systems.

If vehicular surface traffic increases at the projected growth rate of three times that of our population increase, excessive noise cannot help but increase every day.

To procrastinate in legislation and control of excessive vehicle noise, is as much of a crime today as vehicle air pollution was yesterday. Therefore, I urge immediate action on all levels to reduce unnatural vehicular noise pollution, before it drowns out our few remaining natural sounds. Gentlemen, thank you for allowing me this opportunity to speak with you.

Dr. **Meyer**. Our pleasure to have you, sir. Panel? Did I hear, Mr. Tabak, in that list of recommendations, an indemnification proposal?

Mr. **Tabak**. As I understand it, sir, it is done in England.

Dr. **Meyer**. I just want to be sure I understood you.

Mr. **Tabak**. Yes.

Dr. **Meyer**. As I mentioned in one of the other——

Mr. TABAK. Excuse me, indemnification for the soundproofing of the home.

Dr. MEYER. Right. As I mentioned in one of the other sessions of this hearing, it has been reliably reported to me that a similar proposal was followed in Japan near airports, and it's very interesting that you bring this up, sir. I appreciate it.

Mr. TABAK. Thank you.

Dr. MEYER. May I ask if Mr. John Watts is present? If so, Mr. Watts, please come and join us and let us welcome you here, sir.

STATEMENT OF JOHN WATTS, UNIVERSITY OF MICHIGAN ENVIRONMENTAL LAW SOCIETY

Mr. WATTS. Mr. Chairman and members of the panel, my name is John A. Watts. I am a third-year law student and chairman of the Environmental Law Society at the University of Michigan Law School. For the past several weeks members of the Environmental Law Society have been participating in a noise control project with Prof. J. A. Bolt and graduate assistant William Capp, both of the University of Michigan Department of Mechanical Engineering. The interdisciplinary project is designed to develop enforceable noise control legislation for various governmental bodies, and is funded by the University's Institute for Environmental Quality. I might add that it's primarily concerned with vehicular noise.

We have spent much of our time gathering information, interviewing local and State police and highway officials and compiling existing noise legislation and case law. Our research to date has led us to several conclusions concerning what we feel to be the most important aspect of noise pollution legislation: The problem of enforcement.

If the police department is to be an enforcement agency for noise control and abatement, several factors must be considered. Here again it also might be said that the health department could be substituted for the police department, but I think the same problems of enforcement will be in existence. Enforcement of noise control legislation is expensive. It requires special equipment —a reliable sound meter may cost up to $1,000 or above—and trained personnel. Substantial funds should be provided for equipment and extra manpower unless the enforcement can be done by specifically trained police in a vehicle checklane or during the regular vehicle inspection. There again, funds would have to be added, but certainly not substantial funds.

Large trucks can be tested at various weigh stations operated by agencies such as the Michigan Public Service Commission, which is a regulatory agency in Michigan. Enforcement of noise control legislation may be extremely difficult. Weather changes will have a definite affect on measurement devices. Background noise may also affect measurement. Noise created by multiple noisemakers, two or three cars or trucks together, none of whom individually is exceeding the decibel limits, is another problem to be considered by legislative drafting.

Certification and calibration of instruments may be exceedingly time-consuming by the police. Police that we interviewed generally do not want to be put in the position of "enforcing one law at a time." They feel they are trained to perform many duties and this training would be "wasted" if they devoted themselves exclusively to noise control. A three-man noise team (similar to the radar speed control zone) was thought to be a tremendous waste of police manpower by the police themselves. Establishing a civilian "noise team" was not recommended because they would not have the power to make arrests for other observed violations (e.g., concealed weapons). Police also give highest priority to the enforcement of laws which are related to the saving of lives (e.g., speeding) and noise control does not fall into this category—yet. An example of the enforcement problems is Ann Arbor, Mich., which has had a noise control ordinance (90 dBA maximum) on the books since 1965, but has found it almost impossible to enforce because the police simply do not have enough trained men or adequate equipment.

The police we interviewed wanted simple, reliable and inexpensive instruments which could be operated under varying conditions. Until this equipment is developed perhaps the most practical solution is to enforce noise control legislation in the vehicle inspection program, or with noise teams composed of one police officer and one person trained in noise measurement techniques, which is what I understand Chicago is doing.

Definite legislative standards are necessary in order to avoid the problems created by the present statutes which prohibit "excessive and unusual noise." Some commentators consider these statutes unconstitutional because of their vagueness, but court challenges of these statutes have usually been unsuccessful. Policemen, too, recognize the problems in enforcing these "subjective" standards. One police officer mentioned that a judge had dismissed an "excessive noise" case because the motorcyclist was able to prove that his cycle was "factory-equipped" and, therefore, did not issue an "excessive or unusual noise." It was, according to the policeman, very excessive and very unusual.

One basic component of an effective solution to the noise pollution problem, and obviously other pollution problems, is the effective enforcement of manufacturing standards. But several manufacturing representatives profess to be unable to meet "stringent" noise standards—I think we heard some of them yesterday—just as car manufacturers say they will be unable to meet the 1970 Clean Air Act standards by 1975. But there has to be some means to foster technological innovation, to force industries to develop the hardware necessary to meet reasonable standards. There has been little evidence to date that manufacturers will reduce noise levels without government-imposed standards.

There has been little evidence to date that manufacturers will reduce noise levels without government-enforced standards. I know many of them say, "Let the free market, free enterprise system do this for us," but at least we feel that manufacturers today are giving the people what they think the people want. They are creating a climate where noise is something to be almost worshipped.

I think many of us have probably seen this in the advertisements of today. Just the other day there was an ad on TV where, for a child's bicycle, a little device that you could add to it where it said, "It doesn't make the bicycle go any faster, it just sounds like it." That is the kind of thing that manufacturers are doing. Anyway, that is the conclusion of my statement. I have several recommendations, which I won't read, but I will just introduce them as testimony.

Dr. Meyer. Well, thank you very much, sir. Mr. Watts, you pointed out an area of major concern to those of us interested in and responsible for the pending legislation in Congress on noise. I was listening to you, but I was also scanning over your recommendations, and they seem to me to be very forthright, and I would just as soon have you go ahead and read them.

Mr. Watts. Okay. My recommendations are: Federal standards for vehicular noise should be established at the earliest possible date. Provisions should be included which allow for stricter State standards (e.g., H.R. 6986).

I might add, by the way, there was some talk about preemption yesterday and today as far as the uniform standard. We feel that yes, there should be a uniform Federal standard, but I think it would be a very advantageous situation to have the States competing for quietness. It would probably be a tourist advantage to say that, you know, Illinois or Michigan is the quietest State in the country, if that ever comes.

Dr. Meyer. But not at a football game.

Mr. Watts. Right, but not at a football game. Full or matching grants should be made available to police and health departments throughout the nation (either through the Law Enforcement Assistance Administration in the Department of Justice or through the EPA) to purchase equipment and train personnel in noise control.

A system of tax incentives for the manufacture of quiet products should be explored to ascertain its feasibility. The long term goal in the fight against noise pollution should always be to reduce the noise level and not merely to hold the line at an "acceptable" noise level. I think that speaks for itself.

And the last recommendation, additional Federal highway funds might be supplied for research on the use of material for quieter road surfaces. We might also, probably should add, as far as road surface and barriers along the highway, to somehow limit the noise from that. The highway officials we talked to said they have been experimenting with that, and there is obviously a tradeoff on the surfaces, as we learned yesterday, you have to talk about slipperiness as opposed to quietness. With the barriers, you have got an extra barrier for a car to collide with, so you have got to make those kinds of tradeoffs.

Dr. Meyer. Thank you very much. Panel?

Dr. Whitcomb. Very quickly I would like to apologize to you and the other witnesses today for something that just occurred to me; my apparent disinterest in gazing out in the audience has nothing to do with your presentation, but I spent 10 hours yesterday looking over my right shoulder, and it's extremely painful at this point, and it may be true of the other panel members. One quick question, you mentioned the long-term goal in the fight agains noise pollution should always be to reduce the noise level, not merely hold the line.

I have been dealing with noise 12 years, and I know that people who have been dealing with it for 20 years, and we have been saying all during that period, "Let's hold the line and then have a tight schedule." Had this happened 20 years ago, 10 years ago, 5 years ago, we wouldn't be where we are now—don't you agree with that, that maybe even now, if at least we could hold the line on some of these areas, 5 years from now it wouldn't be perhaps still worse?

Mr. WATTS. I guess I would agree with that.

Dr. WHITCOMB. As an addendum to your point, which is valid as a long-term goal.

Mr. WATTS. Yes. OK.

Professor PLAGER. One other quick point, you mentioned the problem of manufacturers meeting consumers' demands and yesterday we had testimony from several manufacturers, either written or oral, indicating that they felt their obligation was to comply with the law and demands of the market.

Would it be fair, would you agree that the manufacturer in fact may be a significant influence in developing or determining what the market demands, that is, through his advertising and presentation of his product, he may, in fact, be filling, self-filling prophesies to what the market demands in his products are.

Mr. WATTS. I would certainly agree with that.

Professor PLAGER. You would think the manufacturer should bear some responsibility for that problem?

Mr. WATTS. I certainly do, and I know Professor Sax at the law school in Michigan has wrestled with this problem that I mentioned of trying to get the manufacturer to do this on his own, to sort of push himself.

Well, from my listening to the testimony yesterday and today, you know, it's just not going to happen. It's going to have to come from some sort of Government prodding, and I am not in favor of, you know, anymore Government prodding than is necessary, but if it would happen without that, I would say fine, you know, stay out of it, but I just don't think it will.

Professor PLAGER. Thank you.

Dr. MEYER. Panel? Thank you very much.

Mr. WATTS. OK. Thank you.

Dr. MEYER. I would now like to ask Mr. Cleveland Walcutt of the commission to draft city noise ordinance of the city of Birmingham, Mich. to come and talk to us.

STATEMENT OF CLEVELAND WALCUTT, CITY OF BIRMINGHAM

Mr. WALCUTT. Gentlemen, I am very grateful for the opportunity of being here today. It gives me the chance to say that noise on our highways is not only excessive, but unnecessary. We believe the noise problem can be readily solved, but not by the approach being made under the recent noise abatement bills.

By "excessive" we mean sound levels near 100 dBA at 50 feet, and we say it is unnecessary since most of the vehicles on the road do not offend when a fast acceleration is made to 50 miles per hour from a standing position.

We heard yesterday about loud noise levels from aircraft. This noise has the dubious distinction of resulting from a service to the public, but the noise I speak of results from no useful service. My concern, then, is not with the majority of drivers, but the few who deliberately make their vehicles noisy, or those who are indifferent to the noise they make. To paraphrase Winston Churchill, "never have so few done so much to disturb so many."

The answer is legislation which will force these noisy few to use existing equipment for more quiet operation. So far we have been unable to take legal actions against the operator of noisy vehicles. We have local ordinances against drag racing, excessive noise, and altered mufflers. The appearance of an officer on the scene will check the drag racing for a time, but a charge of excessive noise—a relative term—is too indefinite to be enforced, while altered mufflers are repaired before the case comes to court.

We have applied to our State and Federal representatives, and to our local government bodies for legislation and ordinances which could be enforced. We received sympathetic replies, and were assured of new legislation; on the local level I was asked to join the Birmingham Committee on Noise Pollution and Abatement.

We studied recently enacted bills and ordinances as to, one, fitness and suitabiity to the problem; and, two, ease of enforcement. Then, because the decibel meter is required to obtain sound levels for the enforcement of the law, we use the meter to monitor a nearby highway.

From our work on the problem we concluded that the recent bills, all similar to the California legislation, failed to provide a satisfactory solution, and that we disagree with an approach on four different counts.

First, we disagree with a concept of relating noise to speed under which almost twice the noise level in power units, an increase of three dB is permitted for speeds above 35 miles per hour. Speed is a basic operating requirement of a vehicle, but noise which can be controlled is completely—is a completely undesirable byproduct. Moreover, with roads in the city and suburbs operated to semiarterial highways, speeds have been raised to 45 miles per hour in residential areas. Therefore, to permit twice the sound level on these streets is both illogical and not suitable to the problem. We also believe the noise-speed relationship is adding an unnecessary complication to law enforcement.

Second, we object to an operational law which is compared to speed laws. We believe this analogy is false. The speedometer permits a driver to regulate the speed of his vehicle to comply with the law. However, he has no instrument to aid him in complying with a noise level specification. We ask how can a person be held responsible for an act over which he has no control? We think all the drivers should be required to do is keep his vehicle in good operating condition.

Third, we do not like the regulation for the enforcement of the law—and good lawyer who becomes familiar with sound level measurement can successfully challenge the evidence brought against his client, and possibly the validity of the law itself. We do not question the value of the sound meter as such, but we wish to point out that it is useful only under controlled conditions.

The new legislation requires the use of a sound level meter set up at a fixed distance from center line of traffic. It is fine if there is but one lane, one vehicle, and no intermittent and extraneous noise, for then the meter will provide a reliable reading. However, under more congested traffic conditions the decibel meter cannot isolate the noise made by the offending vehicle from the noise made by all others on the road. In our limited experience the necessity of noting the speed, the lane of traffic on a multilane highway and the sound level of the offending vehicle is an almost impossible task.

Finally, we object to the allowable sound levels in the new bills which are obviously higher than the noise levels of most of the vehicles on the road today. Our measurement indicated the average noise level on a multilane highway to be 70–75 dBA at 50 feet for cars, and some motorcycles.

Yesterday we heard what the aircraft industry could do in reducing noise under public pressure. We believe the auto industry could make the same improvement under similar circumstances. We think noise pollution legislation should require that, one, manufacturers produce motor vehicles which are sufficiently quiet at all speeds below the maximum speed permitted on the open highway, and at all other conditions of operation.

Most passenger vehicles built today could pass this test. Under this regulation there would be no need for an operational law, for speed-sound relationship or for roadside sound monitoring stations.

Two, the vehicle suspected by trained highway patrols could be taken to a nearby suitable test site which could be considered ideal for the purpose of sound level measurement.

Three, the term "sufficiently quiet" for passenger vehicles and motorcycles be defined at approximately 75 dBA at 50 feet.

Four, existing vehicles on the highway which are found to be in violation would be required to have the mufflers upgraded.

To summarize, studies of noise pollution and sound measurement have led to the conclusion that the recent legislation is inadequate. The allowable noise levels are too high. The concept of relating noise to speed is faulty, and the use of roadside monitoring stations results in data which may not stand a court test. It is suggested that new legislation contain the following requirements:

One, manufacturers produce cars and motorcycles with a maximum noise level of 75 dBA at 50 feet for all speeds below the maximum legal limits.

Two, noise levels not related to speed.

Three, decibel meters be used under closely controlled conditions.

We end this testimony by asking that the Office of Noise Abatement and Control, in its report to Congress not repeat the errors we have described in the ordinances and bills recently enacted by many cities and States. Thank you.*

Dr. MEYER. Mr. Walcutt, thank you very much. We will pay careful attention to your recommendations as we are going over this portion of the material to be included in the report. You raised some problems that we are aware of, and we appreciate the amount of information you provide us here with your views. Panel?

Mr. MARTIN. Mr. Walcutt, in your report you indicate that measurements taken on a multilane highway to be around 70 to 75 dBA at 50 feet, and you say this is for passenger cars and motorcycles. Now, in general your large motorcycles—not the minibikes, but the fairly large ones will all make much in excess of this.

Mr. WALCUTT. I think it says some motorcyces, does it not?

Mr. MARTIN. Well——

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* A prepared statement, along with supporting material is on file at the Office of Noise Abatement and Control.

Mr. WALCUTT. But there are some that are 100 dBA that we recorded there, but there are quiet motorcycles, believe it or not. I mean they can be made quiet, that is the point.

Mr. MARTIN. I know there are ways.

Mr. WALCUTT. We don't know why all of them aren't quiet. Well, as a matter of fact, there is a Japanese motorcycle that was very quiet, and they couldn't sell them until they put on a noisy muffler.

Mr. MARTIN. This is one of the problems.

Do you have copies of this data that was accumulated?

Mr. WALCUTT. On the tape recorder?

Mr. MARTIN. Yes.

Mr. WALCUTT. I have only on a sound tape, I have it with me, if you care to hear it.

Mr. MARTIN. No, I didn't intend to hear it. I was hoping if you had this translated into a report, you might be able to send it in with the full record.

Mr. WALCUTT. All we have now is on a tape record. You see, we didn't have an automatic recorder. As these vehicles came along the road we had a microphone and picked up the sound, and also looked at the decibel meter and indicated on the tape what the level of decibel was, and it went way up.

Professor KERREBROCK. I would just like to add to your list of reasons against roadside monitoring stations, that the noise received by the station depends sometimes very much on atmospheric conditions, wind directions, and so forth.

Mr. WALCUTT. Yes. Well, in that longer report I list about seven things against monitoring stations, and all the difficulties involved.

Dr. MEYER. This is a subject that we are going to study at great length and for which we will include a tremendous amount of information in our record. Thank you very much, sir.

Mr. WALCUTT. Thank you.

Dr. MEYER. Is Glenna Alevizos here, representing the citizens of South Minneapolis?

Mrs. ALEVIZOS. Yes.

Dr. MEYER. I am glad to have you here, young lady and look forward to hearing what you have to say.

Mrs. ALEVIZOS. Thank you.

STATEMENT OF GLENNA ALEVIZOS, CITIZENS OF SOUTH MINNEAPOLIS

Mrs. ALEVIZOS. In 1966 our family moved to Minneapolis from a small town in western Minnesota. We were anxious to settle in our new home. Moving day brought a whole new revelation to us. We had purchased a home under the flight pattern of Wold Chamberlain Field and the noise was intolerable. This same story has been repeated to me time and time again since I became involved in a citizens movement to try to reduce aircraft noise in our neighborhoods.

The story is not unique or new. Many citizens across the country, and in fact the world, are being bombarded with this horrendous plague.

Dr. Michael Eisenberg, chief of surgery at Mount Sinai Hospital, in Minneapolis and who lives under the incoming flight pattern states it this way: "All functions requiring intellectual response of any kind stops when flights are coming in overhead. The senses are dulled and the noise causes extreme fatigue and depression."

Dr. Jack Westman, a psychiatrist from the University of Wisconsin at Madison cites that even noise from household gadgets cause or aggravate a state of heightening body arousal and general nervous tension. What then must continual jet aircraft noise do to the human body?

The Today's Health magazine, July 1970, article entitled "Silencing Invisible Pollution," states that "noise profoundly affects our heart and blood vessels. Noise increases the level of cholesterol in the blood and raises blood pressure. Noise makes the heart work harder by thickening the blood."

The article also reports John D. Dougherty, M.D. of Harvard and Oliver L. Welsch, Ph. D. of Boston as saying, "What has passed unnoticed is that many noise levels encountered in the community exceed standards found injurious in industry."

The noise I am talking about cuts an ugly scar across the southern half of Minneapolis, an area which is known for its beautiful lakes right within the city. A recent noise study indicated that there were approximately 27,000 homes affected by the noise in Minneapolis alone.

The map I have here shows homes that were built in Minneapolis before 1940, and this is indicated by the red dots in this area [indicating], and here you can see the airport location [indicating]—I have the map upside down—the location of the airport and the runways run north and south, this way [indicating], over our homes, and we have continually heard the argument that the airport was there before the homes were, and this is just not true in this case. Many of the homes were built in the 1930's.

The advent of the jet in the 1960's is what really brought the noise into the neighborhood. In 1957 a citizens group fought the expansion of Wold Chamberlain Field, fearing the increase of flights. Sadly to say, they lost their fight. Eleven years later their fears have come true. Noise is intolerable. There are approximately 340 flights in and out of Wold Field each day now and the projection for 1980 is 700 flights per day.

I entered this battle about 1½ years ago slightly naive and hopeful that a strong citizen muscle could strong arm change. Sadly to say, people soon say this is a futile battle. They try to accept the noise or move in bitter frustration. The attitude of many people is often miscalled apathy. It is not apathy but silent desperation.

Our strongest indication of support came from a pamphlet distributed in our neighborhood calling a public meeting about airplane noise. The evening of the meeting, people came in large numbers—as a great surprise to me—and it was approximately 300 to 400 people. Many were retired couples with their homes paid for. They can't stand the noise but they can't afford to move. Whenever my spirits begin to sink I remember that meeting and the hopeful faces—it inspired me to continue to find relief.

So here we are today—yes, noise is finally being considered a form of pollution. What has been accomplished in Minneapolis?

During this past year and one-half we have seen some results and more responsiveness from the airport commission. However, there still seems to be an attitude of tokenism. Initially we were told that flight dispersal was not possible but after continued pressure it has been put into effect more as a matter of understanding rather than a hard and fast rule.

Takeoff procedures can reduce noise to a more comfortable level but here again it depends strictly on the attitude of the airline and the pilot. Many times we have heard that quiet takeoffs imply unsafe procedures. We would like for the pilots to produce such evidence.

Noise was determined as a contaminant and this passed through the past session of the legislature of the State of Minnesota. We are now waiting for the pollution control agency to set effective noise standards.

So there has been some relief but traffic out of Wold Field continues to increase, negating any temporary help from the above mentioned procedures.

We consider the long-range goal to be the phasing out of Wold Chamberlain Field for a more environmentally correct site. The airport commission has spent almost $500,000 on site selection studies and yet after two rejections of the site continue on a narrow one idea concept. We find their lack of leadership most disheartening.

There is no expense account for the citizen. He must bear the cost of this intruder into his home. His property is of less value. In our neighborhood a family which applies for a VA mortgage must sign a paper indicating they know that this area is affected by aircraft noise before the loan is approved.

If he tries to fight for his right to peace and quiet, he must pay the expenses, as we have done this past year and a half—or he simply gives up to the God of progress and moves. At least when a highway takes over property a homeowners is reimbursed.

We believe it is time for the airline industry to admit they are the polluter and begin paying their fair share for the rape of the city of Minneapolis.

Mr. Benjamin Griggs, vice president of Northwest Airlines, indicated in testimony before a hearing of the Minneapolis Legislature that Northwest Airlines does realize they are not a good neighbor.

Assuming the airlines will acknowledge their responsibility, we are asking that steps be taken to start to control noise pollution.

Number 1, that the EPA be allowed to set noise control standards.

Two, we ask that monitoring devices be installed near airports where noise is a problem.

Three, a program of retrofitting be initiated by the Federal Government.

Four, that there be a reviewal of CAB procedures in approving new flights.

A recent editorial in the St. Paul Pioneer Press indicated that the average passenger capacity out of Wold Chamberlain Field was 44 percent.

The answers don't come easy, but we sincerely plead for help. We want to stress we are not antiaviation, we are antinoise.

Dr. MEYER. Thank you very much. Panel?

Mr. HINTON. I have one question of Mrs. Alevizos, Mr. Chairman. Do you feel that there has been any significant improvement during the last year and a half—you said, I think you said conflicting statements, and I wish you would——

Mrs. **ALEVIZOS**. Yes, Mr. Hinton, I do believe that there has been help, especially in the area of flight dispersal. I believe that it has taken a lot of heavy traffic off our runways, and people in the neighborhood have noticed this. I don't believe that takeoff procedures have helped as much as they could. I believe that if all airlines were following these procedures, I believe it would help a great deal.

Mr. **HINTON**. Thank you very much.

Mr. **MARTIN**. Mrs. Alevizos, in your statement you indicated when the highway comes through they pay for the right of land. Do you feel that the residents, the people you are speaking for to some extent would rather their property were taken over as opposed to other changes?

Mrs. **ALEVIZOS**. There are some who would just as soon have reimbursements for their property and be allowed to move. Others feel that they do not want to give up their property, and I think that they would fight for it.

Professor **KERREBROCK**. Mrs. Alevizos, do you represent mainly people from the neighborhood that you indicated there, the older homes, or mainly people who live closer to the airport?

Mrs. **ALEVIZOS**. I indicate—or I have worked with a group of people from my neighborhood, and this is a neighborhood of older homes which were built in the thirties and forties.

Professor **KERREBROCK**. Yes; but what I am asking is does most of the resentment of the airport come from that neighborhood, or from the neighborhoods that have been built up nearer the airport?

Mrs. **ALEVIZOS**. There is resentment from the other neighborhood, but I represent only the neighborhood in South Minneapolis.

Professor **KERREBROCK**. Thank you.

Dr. **MEYER**. Mr. Hinton asked me if I would yield, if he could ask another question, but I have one thing I would like, if you can get a copy of that map and send it to us, so it may be appropriately included in the final printed version of the record, I would very much like to have it.

Mrs. **ALEVIZOS**. All right.*

Dr. **MEYER**. Secondly, could I ask a question? You mentioned one of the alternatives that is being looked at by the newly constituted airport authority people in Minneapolis, mainly relocation. One of the things one has to take into account in relocating an airport, of course, is what I think you alluded to, and I hope I was hearing you right, that it had to be to a site that wasn't going to adversely impact the environment into which it was being moved.

Mrs. **ALEVIZOS**. Yes.

Dr. **MEYER**. It had to be properly planned. We are not trying to move your problem off to somebody else, or to impact some of the beautiful country which you have up in that part of the United States, without taking into account the preservation of those environments.

Mrs. **ALEVIZOS**. This is true. We feel there should be site selection of many different sites, and we don't feel that it has been conducted in the Twin Cities area properly.

Dr. **MEYER**. Fine. Thank you.

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* This material has not been submitted for the record.

Mr. HINTON. Mrs. Alevizos, I guess one question, you mentioned that the freeway taking the land, it has been my feeling—and I would like to get your reaction—that the people who were, whose property was acquired by the freeway right-of-way were the fortunate ones, and those left along the side of the freeways, as along the one in Minneapolis, were the unfortunate ones, and just to set the record straight on that airport site selection in the Twin Cities area, I think the main problem is that it's not to relocate the airport, but to have an additional airport, leaving some existing, considerable existing traffic at the old airport.

Could you comment on the freeway noise?

Mrs. ALEVIZOS. Yes; the freeway noise in our area is very intolerable for those who live next to it, and they have tried to do some studies on that, and set up some kind of a law, and as I understand it this will take place, but I don't know how effective that will be, either.

Mr. HINTON. Thank you.

Professor PLAGER. One quick question for you. You heard Mr. Franks' testimony?

Mrs. ALEVIZOS. Yes.

Professor PLAGER. I think you heard that earlier; you don't seem to express the same degree or level of what I sense to be anger, mixed with concern that he did. Is this because your group has had a more satisfactory experience in dealing with the governmental agencies you have dealt with, or is this simply because you haven't reached that point yet? Can you comment on that?

Mrs. ALEVIZOS. I think that we, at times, have had this feeling of frustration and bitterness, and I think after working this long in it you realize that there are many, many problems, and you try and be as understanding as you can. When you know that they are dispersing the flights on a day when the wind ordinarily would becoming more in your direction, you are grateful for that day of peace and quiet, and so you think well, then, you can hang on for 1 more day. You wont' go sit on the end of the runway—I have made comments to that effect, yes, the next time we meet we will be meeting on the end of the runway, but we have tried to be a responsible organization. We have tried to work with city government and State legislature and be responsible. The anger is there at times, but, yes, we feel—and I think that this hearing in itself has given us a glimmer of hope—we feel that there may be some progress, and we hope that it's warranted.

Professor PLAGER. We do, too. Thank you.

Dr. WHITCOMB. Mrs. Alevizos, how long has your neighborhood been upset by the noise? I know you moved in sort of precipitously, but evidently your neighbors had been upset before then.

Mrs. ALEVIZOS. As I said, in 1957, people began to work. In the early sixties it began to get worse, and it seemed like in, I think it was June or July of 1967, like they say, all hell broke loose. There was, as I understand it, a changing of our runway configuration, and it brought the noise directly over the homes in our area, and that seemed to be the time when it really got terrible.

Dr. MEYER. At this point we are going to take, because of environmental stresses and environmental considerations, a 10-minute recess. Thank you for coming to address this group.

(Short recess.)

Dr. MEYER. Is Miss or Mrs. Del Calzo present?

Mrs. Del Calzo. Yes.

Dr. Meyer. Mrs. Del Calzo, may I invite you to come up and visit with us. You, I believe, are representing the Minnesota Environmental Control Citizens Association?

Mrs. Del Calzo. That's correct.

Dr. Meyer. Glad to have you here.

Mrs. Del Calzo. Thank you.

STATEMENT OF JANICE DEL CALZO, MINNESOTA ENVIRONMENTAL CONTROL CITIZENS ASSOCIATION

Mrs. Del Calzo. My name is Janice Del Calzo and I am speaking as a director of the Minnesota Environmental Control Citizens Association, better known as MECCA. I would just like to explain that MECCA is a 5,000-member volunteer citizen action group evaluating pollution problems and acting to solve them. About a year and a half ago, a number of Minneapolis residents, irate over the noise being generated by aircraft using Wold Chamberlain International Airport, formed the nucleus for a MECCA task force to study noise pollution. I am chairman of that task force. One of the group's first realizations was that until recently, noise was not considered an environmental problem because it was characterized by being highly localized and intermittent. Today, however, thanks to unbridled progress and such devices as all terrain vehicles, snowmobiles and trailbikes, noise has even invaded the wilderness. In metropolitan areas excessive noise contributes to urban decay just as surely as high crime rates or any other problem. The task force needed little searching to discover the major noise pollutors in the area—highways and the airport gain dubious distinction as the winners.

I would like to tell you a little about the particular problem of aircraft noise in Minneapolis and I think the story is rather typical of other cases throughout the country. In Minneapolis the airport is located in the center of a highly residential area with its noise cones extending into several different suburbs. The area of Minneapolis affected by the noise is comprised of middle class homes largely built during the time when the airport site was still being used as a racetrack and decades before the advent of commercial jets. In 1911 the home where I live was built. It is 5 miles from the airport but is considered in a noise zone because it is under the approach path to runway 11R.

The location of Wold Chamberlain was not designed an airport site until 1923. People built homes in the vicinity before and after that date on land zoned for residential development. Charles Lindbergh landed at the airport in August 1927. Residents who still live in the neighborhood remember that flight and sadly lament, "His plane was quiet."

Remember though, his "Spirit of St. Louis" was a single engine craft of only 200 horsepower. It was to be followed by a stream of aircraft each louder than the one before.

Throughout this progression homeowners did nothing more than occupy their homes. It is commercial aviation which has been the dynamic force infringing upon the residents' right to a peaceful existence in this case and not people encroaching on the airport as aviation types would like to believe

For a moment let us inventory the community reactions and ills that arise in areas of high noise adjacent to airports. For awhile people tolerate the noise. Then with noisier planes, more flights, and no consideration for their living conditions, the people organize, protest, demonstrate, seek governmental help in solving the problem, use legal action, and usually in desperation move away. This leaves a neighborhood in which only those who cannot afford to or because of other reasons stay in their homes. Their personal quality of life deteriorates because of the noise.

Meanwhile the neighborhood becomes transient precipitating housing deterioration and ultimately you have all the problems of a slum. It is ironic that the noise which was heralded as an indicator of progress would turn out to be a "ghettoizer."

Getting to the root of the problem of who should be doing something about the noise is an interesting maze.

Airport neighbors always must bring up the matter because when one examines the history of Federal and local agencies responsible for the orderly growth of air transportation, little can be found to show any concern for the residents living near airports. These citizens are met with a confusing situation and a brilliant game of buckpassing.

Airline officials say they cannot do anything about the noise because it is their sole responsibility to provide maximum service, convenience, and safety to the flying public. They also do not care to tackle the expensive-to-solve problem because a solution would not increase their ticket sales—their only criterion for action.

Airlines are also quick to point out that they are highly regulated, have enormous financial problems and since they are only tenants at the airport, the complainers should talk to the airport operator.

If the pilots are consulted at this point about possible procedures to cut noise, they generally reply with what approaches a knee jerk response statement of safety doesn't permit.

It would be interesting to see statistics on the number of crashes and near crashes caused by noise abatement procedures and the number due to pilot error or faulty equipment. It seems this safety argument has been blown out of all proportion.

The airport operator usually tries to ignore the problem as long as possible hoping the people will get tired and just move away. Generally they plan wonderful games of diversion, delay and disinterest. After all, airport operators are more concerned with political considerations and generating revenue than quieting airport environ.

If confronted with Public Law 90–411 which allows an airport operator to establish noise level limits or place restrictions on the type of aircraft using the airport, the operators use a multiple choice response: (1) They retreat behind economic arguments; (2) they state that there must be a better solution; (3) they say the FAA is responsible for rules regulating aircraft engine noise and the actual flight of the aircraft; or (4) all of the above.

The local airport authority in Minneapolis added another choice to the list which they have used since 1947. It consisted of, "Just be patient, people, we are going to build a new airport to solve all the problems."

However, it has now been revealed that the authorities meant a second airport, not a replacement for Wold Chamberlain.

Clearly the residents around an airport have no ally in the FAA which has the dual responsibilities of promoting and regulating air traffic. Given a choice, the FAA chooses to push the promotion angle and completes the buckpassing cycle by saying noise is a local problem and should be handled accordingly.

The lack of FAA concern is typified in remarks made by its Administrator, John Schaffer, during a congressional hearing in February 1970. He was urged to condition the refitting of the 707 wing assembly on noise suppression of its engines. He replied that it would be sacrilege to scrap that plane for the sake of quieter airports. He also insisted that it was unthinkable to require Boeing to solve the 747's noise problem before putting it into production.

This seems to reflect the industry feeling which asks people to consider the airport's value to the community and commercial aviation's value to the Nation while dismissing jet noise complaints as being purely emotional.

Throughout this game if anyone suggests cutting flights as a means of reducing noise—after all why should we have the equivalent of 99 empty jets flying the Atlantic daily—all parties darkly hint at CAB intervention. Perhaps the CAB chooses to regulate the wrong areas of air transportation.

One of the frustrations the citizen experiences throughout is the inequity of the whole affair. For example, if a stranger ran through your living room 20 times an hour generating noise levels of 95 decibels, you could have him arrested for disturbing the peace, trespassing, et cetera.

But a plane going overhead yielding the same noise level and spreading air pollution as well is sacrosanct under the present messed-up system.

It is a case of the individual being asked to assume the full burden of industry's pollution. It sounds similar to campaigns of city officials asking housewives to use nonpolluting detergents while these same officials turn their back on the municipal sewage system practice of dumping millions of gallons of untreated wastes hourly into the nearest waterway. Unless people in power assume responsibility, individual actions are useless.

Where has all this led? Across the country a growing counter antinoise protest against airports is being heard. It has been estimated that between 3 and 10 million people belong to that minority group characterized by living in high aircraft noise areas.

Many within that number are becoming extremely vocal and just think what a voting bloc that group could be.

Whenever a new airport is proposed, people living around the site organize quickly to block the construction of the facility. They realize that others have been plagued by noise and want no part of it.

It should be obvious to government aviation specialists that all these people are not victims of some type of paranoia as has been intimated. Rather these officials should look into the why of the people protesting.

An indictment that airports have not been good neighbors in the past would be clear. It would also be apparent that given present conflicting and weak regulations there is no reason to believe that future airports would do better.

Some proposed solutions to the problem of high noise around airports offer relief, but all fall short of providing anything approximating a pleasant environment.

For example, improved flight procedures to reduce noise to provide a noticeable reduction in decibel levels. To be really effective, however, some agency must have the authority to make these procedures mandatory and enforce them by means of monitoring systems.

Runway utilization to equitably distribute the traffic around the airport is a buying time solution. It doesn't solve the problem, only shifts it around.

One solution that has been proposed at Los Angeles and which seems totally unacceptable as a means of alleviating noise is that of buying the homes and clearing out neighborhoods adjacent to the airport. What a total and utter waste of resources to spend millions of dollars on a plan that compounds rather than ameliorates the situation.

In this case the homeowner in essence is being punished—it is like asking the victim to pay for the crime.

And even after spending vast sums to remove the most severely affected neighborhoods the problem will still be present in other surrounding the airport.

Another unacceptable approach is the hands off attitude which says, "Learn to live with the noise."

People can accept a lot of unpleasant experiences, but why should they suffer an unnecessary one? Forcing a person to live with high levels of noise is just adding one more ingredient of less than ideal living conditions when we should be talking about improving them, not degrading them.

I am not saying that the air transportation industry is all bad. What I am saying is that with any progress there are associated costs and to date the air transportation industry has not borne them.

One true solution to the noise problem is to remove the highly objectionable airports to new environmentally correct sites and having local authorities stringently zone around them so the old problems do not reoccur.

New airports are costly and so are the suggestions to retrofit present engines and design new quiet engines for future aircraft. When making up the specifications for engine designs in the past, the airlines asked for safety and low maintenance features, both of which helped to sell tickets and cut down costs.

Obviously a quiet engine would do neither of these two, so the airlines forced the nearby residents to suffer the noise because of their unwillingness to assume the nonproductive costs of quiet engines. The flying public also must assume its burden for the privilege of flying and if that means higher fares to pay for noise abatement, at last the burden is sitting on the right shoulders.

The blatant truth is that no agency is adequately protecting the people living near airports from exposure to intolerable noise levels by requiring such measures as those just stated. It is for this reason that the Environmental Protection Agency should be given the authority to set standards for community noise exposure and be given the power to see that they are enforced. These standards should be based on what the citizens find acceptable and must not be weakened by economic feasibility arguments.

With the environment and the welfare of the people as its only concerns, this body should not fall victim to the mistakes and shortcomings of the present regulatory agencies.

Dr. MEYER. This was a most thoughtful and well prepared statement. Panel?

Professor PLAGER. I have one quick question for you, Mrs. Del Calzo. I don't wish to get into a hassle between our honorable chairman and the people who are tearing down houses around the airport, but is there anything really wrong with a governmental policy which provides for compensating, including the purchase price of the home for people who would rather move, and would like to have a governmental agency to sell their property to, if there be, if they are subject to excessive airport noise?

Mrs. DEL CALZO. With me it is just a feeling that you are asking the wrong party to pay the cost. True, you are paying him for his financial burdens in buying a new home, perhaps, but there are other nonfinancial costs associated with moving; the psychological disruption of a family, things like this.

Professor PLAGER. How about if he is asking for out?

Mrs. DEL CALZO. If he is asking for out?

Professor PLAGER. If the homeowner wants out.

Mrs. DEL CALZO. I would say yes, I think that would be an acceptable solution. I still have qualms about what it would do to the neighborhood.

Professor PLAGER. I don't offer it as a cure all, but I just wonder if there is any reason to oppose the Government pursuing that course, if people wanted it.

Mrs. DEL CALZO. If the person wants it.

Professor PLAGER. Thank you.

Mr. HINTON. I have a couple of questions, Mrs. Del Calzo. I would just like to refer to the point about the purchase of homes. A case in point involved a tract of houses in Los Angeles, and those are all on a voluntary sale, it's not a public condemnation question in that particular case.

Mrs. DEL CALZO. It seems impossible to me that everybody in the neighborhood can simultaneously want out. I am sure that it's a blockbusting type of a thing, that if some people start moving out, then everyone moves out, and to me that is destroying a neighborhood.

Mr. HINTON. I would like to ask you, in Minneapolis do you feel—I should say the Twin Cities—do you feel there is any possibility for an early solution to the problem, or do you feel it's a hopeless situation unless there is firm Federal Government action?

Mrs. DEL CALZO. I think left up to the local authorities it's a pretty impossible situation. Minneapolis doesn't have the problems that some of the other airports have right now. The traffic just isn't as heavy as Los Angeles or Chicago. For this reason, it's one of the reasons I am fighting it, let's not let it get to that point, but if we leave it in the local hands, we are not going to get anymore action than we have in the past. A case in point is this new airport that they have talked about for 24 years. It just isn't coming, and it probably won't come because of the political considerations in siting a new airport, so it looks like we probably won't get a new airport, and then in order to prevent this deterioration we are going to have to have something done about the present one, and to me that entails all the things I mentioned, monitors——

Mr. Hinton. One final question, and this follows as a followup to my last question, which you answered very well, and that is in the Twin Cities the airport commission is made up of nine members; eight are public officials of the two cities, the two cities which are most adversely affected by the noise from the airport. This is different from the O'Hare situation where the surrounding communities do not have control of the operation of the airport. Can you comment just very briefly on how it can be explained that the local municipal officials have not taken action over these 24 years that you mentioned to prevent this problem arising, in view of the past citizen request for steps as described by Mrs. Alevizos?

Mrs. Del Calzo. Let's put it this way, yes, the airport commission is composed of elected and appointed officials. However, the noise zone in the city of Minneapolis does not extend across the city, so you have got a pocket of people who are very, very upset about the noise. They do not have a majority voice in elections, in getting people who are sympathetic to their cause either elected or appointed to this body. It's not a community-wide problem. I think this is one of the things you see so clearly with noise, that it's only when you, yourself, are affected by it are you really moved to action, and there just is not—it truly is a large number when you look at it, but it is not enough to move those city officials.

Mr. Hinton. Thank you very much.

Professor Kerrebrock. I think there are lot of steps in trying to solve this problem, but certainly one necessary step is to determine just what is an acceptable noise level, and as I asked Mr. Franks to do, I would ask you to, if you can, try to perform this judgment with your associates as to when this noise became unacceptable, and give us your answer, because, you see, the burden falls on someone to make a decision as to how much noise will be tolerated, because it can't be zero, that is clear——

Mrs. Del Calzo. That is true.

Professor Kerrebrock. And it's very expensive to reduce it, so we need the numbers.

Mrs. Del Calzo. My feelings on that would be not only it applies to aircraft noise, you mentioned when did this situation become intolerable—I think in the areas around the airport it became intolerable when the jets were introduced to it, but, however, we have other problems with noise, and I guess my feeling would be that when the noise starts interfering with normal activities—for example, speech interference and that type of thing, is when you cross the line, when it's—when it becomes an irritant —and I realize there are individual differences, so that these, you know, what is irritating to one person would not be to another, but I think the only thing you can do is go by the norm. If you have 100 people and 75 people say this is irritating, then that should be where the standard is.

Professor Kerrebrock. But I would point out to you that that level varies by 20 decibels, depending on how the experiment is run, and who you ask, and 20 decibels is many, many, many, many hundreds of millions of dollars.

Mrs. **Del Calzo**. I would rather have you err on the low side than the high side, let's put it that way, if you are going to have to set a standard, set it lower than you think.

Dr. **Meyer**. Thank you very much. I appreciate this.

Mrs. **Del Calzo**. Thank you.

Dr. **Meyer**. It's most useful to us.

Is Mr. John Desmond, chairman of the Illinois Task Force on Noise still with us? Mr. Desmond, you have been most patient and understanding, and sat through a long day. I am happy to have you here, sir.

Mr. **Desmond**. It has been most enlightening sitting here waiting, Mr. Chairman. Thank you, sir.

Dr. **Meyer**. I would suspect that since you are chairman of a task force on noise all this discussion would be of some interest.

Mr. **Desmond**. It motivated.

Dr. **Meyer**. Yes, sir. Happy to have you, sir.

STATEMENT OF JOHN DESMOND, UNIVERSITY OF ILLINOIS TASK FORCE ON NOISE

Mr. **Desmond**. Indeed I do wish to describe some of the activities of the University of Illinois Task Force on Noise. Many, many hours ago, however, you did ask a question that I would like to pick up on, and then carry it further on into describing the Illinois task force.

You had raised a question with Mr. Karplus, in what ways could the Federal Government take some leadership within perhaps an educational context, and I, being a representative of an educational institution, feel compelled, separate and apart from reporting on our task force, to volunteer a response to that, and with a possible danger of sounding crass, I would like to propose, Dr. Meyer, that as you realize your legislative program, as your charge becomes much more solidified, and you begin to worry about the future ways in which the noise program and the EPA conducts its long term efforts, that the universities historically had been quite responsive to those expressions of public concern that come via the elected Congress down into the administrative agencies—here I am making a pitch, a very strong one, that as you develop your program, that you think seriously about the ways in which universities can not only help you formulate your program, but also respond in the developing of new understandings and methodologies about this general area of noise.

I would go one step further, even though I represent a college of engineering, to suggest it is not only the support of advancing technologies in attenuating noise, as we all have gathered here in these hearings today, it's a matter of noise, the matter of noise is clearly not only a technological question, it's one of other sciences, other disciplines as well being involved.

Much greater understanding has to be sought, true, on technological improvements in attenuating noise, but we must also understand better the physiological and the behavioral affects of noise, and then I would also like to make a very strong pitch that there has to be a whole new generation of engineers, scientists, and lawyers who are totally responsive to the complexities of the science, the technology, the law of environmental improvement.

I have conveyed very strong feeling, once you recognize it, within the universities you have an ally to not only supply you with the new understandings of these complicated matters, but they are the only human enterprise that I know that also supplies you with the successive generations of well-trained people who are not only equipped to deal with these problems, but hopefully as we educate our people better, with your support they are also quick with the sensitivities to deal with these problems.

Now, let me go on in a more specific vein, relative to that entity that is known as the University of Illinois Task Force on Noise—and in a way I suspect it might disappoint some of you on what I have to report, because it is, in some respects, a progress report, and not a final report.

The State of Illinois Institute for Environmental Quality was asked by our pollution control board, as they began to sense—as must they should, the increasing concerns about noise, to seek out experts—a task force, as it were—to advise them and counsel them on the types of noise regulations that the State of Illinois might adopt.

As it is quite clear to many of you, the major concern, the major pressure, the major outcry in the noise area has revolved around airport noise.

The pollution control board had before it a citizens proposal, which it was statutorily obligated to hear and subject to public hearing, the task force then became just as preoccupied with the airport noise problem as the pollution control board did.

We assembled an interdisciplinary team of physiologists concerning themselves with acoustic trauma, psychologists who concerned themselves with the effects of noise upon human behavior, human performance, speech interference, interference of sleep; engineers, aeronautical engineers, mechanical engineers, agricultural engineers, physicists, and lawyers to take as broad as possible a look as we could at this terribly, terribly technically complicated as well as legally complicated area of environmental concern.

Our task force also included one other important person, and that was Mr. John Moore, who was the Chief of the Division of Noise Abatement and Control on the State level of the Environmental Protection Agency.

As the hearings were conducted relative to the CAP, there was a certain amount of dissatisfaction registered as to the viability and workability of that proposal. Some of this was expressed by the citizens representatives themselves. The pollution control board at that point asked whether the task force would be willing to subject the CAP proposal to a thorough scrutiny, and to develop an alternate proposal.

The past several months of our efforts have been devoted to the conceptualizing of a scheme that has as its major set of thesis that one must have to acknowledge the economic contributions of a major airport in a metropolitan area, but also one must recognize that the costs, the noise burdens, as it were, must be borne by several interests—as much as one can have those burdens borne as well as by the airport proprietor, as by the citizenry.

What we intended to do is try to develop a scheme which attempts to predict the noise exposure emanating from an airport, contrast this with the land uses around the airport and try to reconcile the conflicts.

I would prefer not to go in greater detail than providing that overall general scheme that we have in mind. I think there is not a matter of being secret, or obscure on this question; I think it's more a protocol question. It's a matter that our prime responsibility, that is, the institute for environmental quality and to the pollution control board, which in turn, has its responsibility to the citizens.

When we have our proposal along sufficiently, and it's going through an experimental check at the present time, we will be proposing to the pollution control board this form of a structure of regulation which will then be subjected to their analysis, and then open for public hearing, and I am sure that we will be seeing many of you again, perhaps to advocate this particular regulatory scheme.

I should tell you of other matters that we are dealing with as well, because many of you have broader noise interest than the airport noise problem. We are being aided in our efforts by the firm of Bolt, Beranek and Newman. Bolt, Beranek and Newman have submitted to us for our analysis and critique and ultimate submission to the pollution control board, a set of regulatory measures that deal with other transportation noises other than aircraft and airports. Within a matter of a week we would expect to receive also a proposal for our analysis and critique from Bolt, Beranek and Newman that deals with stationary noise sources, property line problems.

I think one is always subjecting himself to some risk when he tries to place a time scale, when he can bring all of these matters to some degree of maturity worthy of hearing by the pollution control board and the interested citizens.

It is our hope, although we have a fair amount of work yet to do, that sometime during the early to midfall, this package of regulations would be submitted to the pollution control board and the appropriate necessary public hearings would soon grow out of those proposals.

I believe, Mr. Chairman, that fairly well summarizes what we are and where we are at the present time. I would be wiling to field questions. I would ask for some small amount of patience relative to the amount of details that would be appropriate to convey at this time.

Dr. **MEYER**. I have found your presentation very interesting because our Agency, in preparing this report, is trying to find out, in addition to what is going on with the Federal Government and what industry can do, what the States and the municipalities are doing. So this information as to an approach being taken within existing arrangements of the State government is very useful and will be turned over, after it's typed up, to the people in my Department who are working on this. Panel?

Mr. **MARTIN**. Mr. Desmond——

Mr. **DESMOND**. Yes.

Mr. **MARTIN**. You indicated that BBN is preparing a report for you now on recommendations. Of course, the Chicago ordinance basically was written by BBN——

Mr. **DESMOND**. Yes.

Mr. **MARTIN**. And the levels, et cetera. Why haven't you taken and reviewed those—I assume the BBN report, which will be similar, why didn't you use the Chicago ordinance as a basis for the State?

Mr. **DESMOND**. Well, on advice from BBN—and I don't think they were merely trying to peddle advice, there are basic differences in the standards that one has to apply in a totally metropolitan area than those that one has to apply in a statewide situation. We have taken a look at the Chicago noise ordinances, and I think that they have a high degree of regulatory validity. There are many situations which the State has to deal with that in many cases the cities or municipalities do not have to deal with.

I think we touch on a broader set of noise emission settings as we approach it from the statewide angle. There will be some similarities, but there are some distinctions as well, and we are now going through the analysis of the BBN proposal, which we received just this past week.

Mr. **MARTIN**. Let me ask just a followup on this: is it the intent on the state—and maybe you can't answer this—to preempt the Chicago ordinance?

Mr. **DESMOND**. The understanding that I have in the discussions with Jack Moore is that there is no real intent to preempt the Chicago noise ordinance. As a matter of fact, the Environmental Protection Act and its earlier versions involving water quality, essentially stated two jurisdictions, Cook County and the rest of the State. The present Environmental Protection Act does not make such a distinction.

I think that what there will be is, hopefully, a degree—and again I can't talk totally about the State, because this is not my jurisdiction, but it is certainly true that what is hoped to be achieved is a high degree of cooperation between the Chicago noise enforcing agencies and the State enforcing agencies.

Mr. **MARTIN**. One further question on this. Do you think that the State of Illinois would care to have a uniform, nationwide standard which would preempt the State standard, and then the State would just have to enforce it?

Mr. **DESMOND**. Well, I suppose I ought to turn to someone other than me to answer that kind of a question.

I can see the great validity in uniformity, but I guess one of the things that really worries me about it is that different States have different needs, and I think there ought to be some available mechanism that lets a State address itself, analyze its own particular needs in the noise control area and develop regulations that are responsive to those peculiar needs of their own State.

What I would like to see, of course, is that the State of Illinois take such an enormous amount of leadership in this particular area that we could represent model kinds of regulations, but again adapted to the individual needs of the State.

Mr. **MARTIN**. Let me ask you one more question, with that concept in mind, the thing that, the fear that I see is that every State, if every State satisfied its own needs it would become almost an impossibility, with the manufacturing industry, to provide a real economical product.

Mr. **DESMOND**. You have got some of that going on right now, have you not?

Mr. **MARTIN**. Yes, sir, because there are a multiple of different standards being used, and without a uniform standard and the level—I am not talking one level to another, but you could proliferate a high cost vehicle for a single state——

Mr. **Desmond**. Don't you see a—don't you see a certain amount of uniformity creeping into this, even though States are doing it singly, one notes that many States looked very, very closely at what was going on in California in noise control regulations.

Vehicular automotive noise standards began to be developed; manufacturers immediately started putting a noise package on automobiles that were delivered into California.

Another state adopts the same standard in replication of the California standard; therefore, the noise package is also sent to that State.

One or two more States adopt a standard that has a high probability of being similar to the California standard, then the entire automotive industry will probably move and uniformly equip all of them, irrespective of what State they go into, irrespective of whether they have regulation or not, that same noise package.

Dr. **Meyer**. Well, if I might comment before moving on to the next witness, one of the things that the legislation now pending before the Congress envisions is that the Federal Government set standards. And the States would enact use restrictions that may be put into effect in a number of ways.

One of the great dangers occurring with a variety of State standards is that one of them may be predicated upon the best knowledge available as to the law of the possible——

Mr. **Desmond**. Yes.

Dr. **Meyer**. By discussion with industry and others at arriving at one conclusion as to the law of what is possible. This might be a completely different conclusion than the one that the Federal Government, with its much greater ability to bring together a variety of national experts in a different arena, can arrive at. And I think you have to keep in mind that to a large extent the California law represents, based on the testimony we have heard in Atlanta here as far as vehicles are concerned, somewhat approximated the law of the possible. So it may be that by doing this you do not arrive at the best value judgment as to what can be done in the future or what can be done right now in a rational way. Thank you very much.

Professor **Plager**. Mr. Chairman, just one quick point, a followup on your point, which I thought was an excellent one. The problem there, this preemption in uniform problem has been one that has run through these hearings, and I think it important that the record be as complete as we can make it on this.

Mr. Desmond, perhaps one problem I would like to get your reaction to, this idea, perhaps one problem is that preemption and uniformity are very high level of abstractions in generalities, and as our chairman has just indicated, one set of distinctions can be made on the basis of use activities versus manufacturing qualifications and standards.

Perhaps another way of slicing it, and again I would like your reaction to the idea, is perhaps we need to look at individual kinds of items, individual kinds of uses. Some goods are central to an interstate commerce role in this nation, some goods are not. Some products are kinds that need uniformity in order to make them economically feasible and desirable; others may not be, and I wonder how you would feel if a sense of Federalism in which both the Federal and the State Government didn't begin from an absolute position on either end of the scale, but rather worked out, over time, agreed positions with respect to the kinds of products, taking into account distribution patterns in the country; and needs of the manufacturer, uses and all of these things, and worked our way through this problem in a more empirical sense than the sweeping generalities and preemption might suggest.

Mr. **DESMOND**. Yes. Well, obviously your question implies the answer; this is eminently sensible, I agree with you.

Professor **PLAGER**. Thank you.

Dr. **MEYER**. Thank you. Thank you very much.

Mr. **DESMOND**. Thank you.

Dr. **MEYER**. Is John Varble, the mayor of Bensenville, Ill., still with us?

Mr. **VARBLE**. Yes. Mr. Meyer, it's a pleasure seeing you again.

Dr. **MEYER**. Yes, sir. Nice seeing you, Mr. Mayor.

STATEMENT OF MAYOR JOHN VARBLE, BENSONVILLE, ILL.

Mr. **VARBLE**. Members of the panel, I am here representing my community in a twofold manner, but we are primarily interested in the aircraft noise. I want to commend you; you are having your meeting down here. I think you are cowards. Why don't you have it out at O'Hare Field? One of the inns there, were you a little afraid that you might not get as far along?

Well, I will say this, when we had a meeting there, I think Mr. Hinton attended the meeting and we had something like 22 mayors there, and the attorney general from the State of Illinois spoke. The planes, for some reason, did not come over that night, but the next day they didn't know we were holding the meeting again the next day, and it was almost impossible for us to conduct the meeting.

Now, I am sure you have been all through this before. I will say that night I called the tower and told them we were having the meeting; they sent them all over George Franks' home, so we didn't have much to worry about, so he could argue a little bit. My neighbors here from Park Ridge and Schiller Park and Wood Dale, they all know what I am speaking about. Gentlemen, you have had some excellent testimony here, and I agree with everything that has been said. This started a number of years ago. Lloyd met with me in Washington. At that time we were lucky to get one congressman to attend our meeting. The last time we had more congressmen there than I think we had delegates. This, of course, is an exaggeration, but at least we have always felt that this is a matter that has to come from the Federal level—with all due respect to the State help, and that we need every bit that we can get, we feel that the laws have to be enacted in the halls of Congress to alleviate this condition which we deem most serious with the aircraft noise.

Frankly, I don't know the rate of climb, this is just a temporary measure, in my own personal belief—and those that I have met with, for many, many years, and this is not a johnny-come-lately thing with us, I don't feel that there can be any answer to it, but just retrofitting the engines, and that is where they—that is where she boils down to, and that is just the problem the way I see it, it's no more than putting a muffler on a Ford, as I have said, and they can't change my mind on this, and we have the expert knowledge, and we have had the men who have testified at many hearings, and I told you, Dr. Meyer, in Washington, your office being set up was one of the greatest things that we have had, because now we feel instead of the runaround through the FAA—and I respect their ability—but there was no one set up to listen to our complaint about the noise of aircraft.

Now, try to sell a downstate legislature the noise program here in Chicago, when they are worried about the corn blight, they could care less about the noise plight here, or the same thing in Nebraska, the senator out there.

We have had, as I say, many meetings. We have listened to all of these preliminary, or this idea of what can be accomplished, and moving people out of their homes and buying the land, and I said this utopian dream of having a wasteland around the airport, which is just not feasible, and it's not going to be, and if you think so you better think again, and I will tell you what the whole story is, and this is the way it's got to be approached.

The name of the game is politics, and when we went to Washington 3 years ago I sat right in the Senator's office and told him that, and from then on we have had a most remarkable rapport with our Senators. Let's put it that way, I will say that the people—and you have heard them state this, the lady from Minneapolis and George Franks who talked up here—I am sorry I didn't get to hear all of it, but I think that these people point out very, very firmly that the people have had it, and when they do, they want to be listened to.

Now, they will either change their Representatives in Congress, or they will change their Senators, and this is going to be a political issue in the years to come. Now, it hasn't been, but it's going to be that, I can assure you, so for this panel today I know that our pollution experts talked to you. I did not come up here to try to talk engineering matters to you.

You gentlemen are far more capable than I am on that, but I will just tell you the bare facts of this thing, the way that I see them, and that is to try to have Federal enactment of laws preempting—I am not so certain that this cannot be done—I know that Illinois is making strides, and has made tremendous strides in it, and I am familiar with California, and I am also familiar with Massachusetts and their rule that was just passed. Lloyd, you saw that today, and I am very familiar with New York State, so all in all what we are trying to do, and this is what your department most hopefully will succeed in accomplishing, is comprise this thing, and get it back into Congress where it belongs.

May I ask you if you received, Lloyd, did you supply Dr. Meyer's office, which we passed at the national meeting, the four points that we wanted taken up by resolution?

Mr. HINTON. Yes, he has them.

(The resolution referred to above is as follows:)

NATIONAL ORGANIZATION TO INSURE A SOUND-CONTROLLED ENVIRONMENT

RESOLUTION NO. 1-71

To be considered for adoption at the annual meeting in Washington, D.C., May 19, 1971.

In re: Federal certification of airports with respect to the nature and number of operations and the resultant aircraft noise exposure.

To: The President, the Congress, the Chairman of the President's Council on Environmental Quality, the Secretary of Transportation, the Secretary of the Housing and Urban Development, the Chairman of the Civil Aeronautics Board, the Director of the Environmental Protection Agency and the Administrator of the Federal Aviation Administration.

1. Whereas, Pursuant to enactment of the Aircraft Noise Certification Act of 1968 (Public Law 90–411), the Congress determined that noise occurring due to the operation of jet aircraft constitutes serious derogation of environmental quality in hundreds of communities in the United States, and

2. Whereas, Pursuant to enactment of the Department of Transportation Act of 1966, the Housing and Urban Development Act of 1968, the National Environmental Policy Act of 1969, the Airport and Airway Development Act of 1970, et cetera, the Congress has established a requirement for the inclusion of relevant environmental factors in the further development of the national airport system, and

3. Whereas, Pursuant to enactment of the Airport and Airway Development Act of 1970, the Congress established the requirement that safety standards be adopted as criterion for civil airport certification, and

4. Whereas, Pursuant to enactment of the Aircraft Noise Certification Act of 1968 (Public Law 90–411) the Congress expressed its desire to provide "both present and future" relief of high aircraft noise levels, and

5. Whereas, The aircraft engine and airplane manufacturers, the NASA and the FAA have developed engine and aircraft designs which are quieter than previous aircraft and have developed and are developing operating procedures for takeoff and landing which produce less noise under the flight paths than present aircraft, and the benefits of some of these developments have been known for several years and have not been utilized in airline aircraft design and operating procedures.

Therefore, Be it resolved that the Congress be petitioned to amend Public Law 91–258 (the Airport and Airway Act of 1970) by adding to the safety requirements for civil airport certification the requirement that specified aircraft noise exposure forecast (NEF) contours near takeoff and landing flight paths be limited to locations within specified boundaries, and, further,

Be it resolved that the amendment also require that in the future a scheduled step by step reduction of aircraft NEF levels within the specified boundaries be achieved as a condition for the retention of existing air transportation services.

Approved, this 19th day of May 1971.

Ralph G. Caso,
President.
John C. Varble,
Secretary.
Stanley W. Olson,
Treasurer.

RESOLUTION NO. 2–71

To be considered for adoption at the annual meeting in Washington, D.C., May 19, 1971.

In re: A Federal Government requirement for jet aircraft operating procedures and other measures necessary for the abatement of noise.

To: The President, the Congress, the Chairman of the President's Council on Environmental Quality, the Secretary of Transportation, the Chairman of the Civil Aeronautics Board, the Director of the Environmental Protection Agency, and the Administrator of the Federal Aviation Administration.

1. Whereas, Pursuant to enactment of the Aircraft Noise Certification Act of 1968 (Public Law 90–411), the Congress determined that noise occurring due to the operation of jet aircraft constitutes serious derogation of environmental quality in hundreds of communities in the United States, and

2. Whereas, Pursuant to enactment of the Department of Transportation Act of 1966, the Housing and Urban Development Act of 1968, the National Environmental Policy Act of 1969, and the Airport and Airway Development Act of 1970, the Congress has established a requirement for the inclusion of all relevant environmental factors in further development of the national airport system, and

3. Whereas, It has long been established that the manner in which jet aircraft are operated during takeoff and landing has significant effect upon noise exposure heard on the ground, with such procedures designed for reduced noise not derogating safety, and

4. Whereas, In 1965, the President established the Interagency Aircraft Noise Abatement Program through which aircraft operating procedures, number of day and night jet operations and other measures were identified as having both short and long term benefits in reducing noise exposure upon people in airport communities, and

5. Whereas, The report of the President's Airport Commission (Doolittle Commission 1952), together with the report of the Task Force on National Aviation Goals, 1961–70 (Project Horizon), each identified the growing problem of community exposure to high aircraft noise levels and recommended measures needed to reduce existing noise problems as well as prevent their arising in the future, and

6. Whereas, Through enactment of Public Law 90–411 in 1968, the Congress expressed its intention that the Federal Aviation Administration would implement measures needed for "present" as well as "future" relief from excessive exposure to aircraft noise, and

7. Whereas, The Federal Aviation Administration is unable to meet its responsibility for "the protection of persons and property on the ground" (Federal Aviation Act of 1958, Section 307(c)) due to its primary and pervasive mission of promoting air commerce resulting in exclusion of consideration of environmental quality, now

Therefore, Be it resolved that Congress is hereby petitioned to authorize and require the Environmental Protection Agency to establish, for the relief of airport neighbors, noise exposure forecast (NEF) contours which must be maintained within specified boundaries near airports, after consulting with the President's Council on Environmental Quality, the Secretaries of the Departments of Housing and Urban Development, Health, Education and Welfare, Interior, and Transportation and the Chairman of the Civil Aeronautics Board.

Approved, this 19th day of May 1971.

RALPH G. CASO,
President.
JOHN C. VARBLE,
Secretary.
STANLEY W. OLSON,
Treasurer.

RESOLUTION NO. 3–71

To be considered for adoption at the annual meeting in Washington, D.C., May 19, 1971.

In re: Acoustic retrofit of existing civil jet aircraft.

To: The President, the Congress, the Chairman of the President's Council on Environmental Quality, the Secretary of Transportation, the Secretary of the Housing and Urban Development, the Chairman of the Civil Aeronautics Board, the Director of the Environmental Protection Agency and the Administrator of the Federal Aviation Agency.

1. Whereas, Pursuant to enactment of the Aircraft Noise Certification Act of 1968 (Public Law 90–411), the Congress determined that noise occurring due to the operation of jet aircraft constitutes serious derogation of environmental quality in hundreds of communities in the United States, and

2. Whereas, Pursuant to enactment of the Department of Transportation Act of 1966, the Housing and Urban Development Act of 1968, the National Environmental Policy Act of 1969, and the Airport and Airway Development Act of 1970, the Congress has established a requirement for the inclusion of all relevant environmental factors in further development of the national airport system, and

3. Whereas, The National Aeronautics and Space Administration, and others have determined the technical and economic feasibility of acoustically retrofitting existing civil aircraft engine nacelles thereby providing substantial noise reduction particularly during approach to landing and most noisy phase of flight, and

4. Whereas, Through investigation of a variety of measures applicable to the resolution of airport/community's problems arising from high aircraft noise exposure levels, NOISE has determined that no one measure such as acoustic retrofit will in itself resolve the airport/community problems attributable to aircraft noise, now

Therefore, Be it resolved that the Congress be petitioned to authorize and require that the Environmental Protection Agency establish NEF limits in areas near airports with the full recognition of the benefits to be attained through the application of acoustic retrofit, together with other measures which can be taken to reduce aircraft noise, and

Be it further resolved that in recognition of the economic impact of such a program, all methods of financing including a surcharge to be applied directly to the users of air transportation services, be explored by the CAB.

Approved, the 19th day of May, 1971.

RALPH G. CASO,
JOHN C. VARBLE,
Secretary.
STANLEY W. OLSON,
Treasurer.

RESOLUTION NO. 4-71

To be considered for adoption at the annual meeting in Washington, D.C., May 19, 1971.

In re: Responsibility for the protection of residents from exposure to high aircraft noise levels.

To: NOISE membership and other concerned airport/community officials.

1. Whereas, NOISE was established to investigate and seek implementation of all available measures for the relief of aircraft noise exposure upon airport/community residents, and

2. Whereas, Through investigation of all applicable measures needed to reduce airport/community exposure to high aircraft noise levels, NOISE has determined that controls upon land use development in the vicinity of major airports are essential, and

3. Whereas, NOISE has determined that it is necessary to implement local, regional and statewide land use controls, and

4. Whereas, Even though municipal, regional and state officials are aware of the existence of derogatory environmental factors associated with aircraft operations near major airports they have been unable to persuade the governing bodies of these local communities to establish zoning, building code ordinances, subdivision regulations, et cetera, to protect the people in these areas near airports from unacceptable levels of aircraft noise exposure, and

5. Whereas, Financial incentives are effective in persuading landowners to accept land use constraints or to make land use conversions thereby removing the barriers to the establishment of the local laws, codes, or ordinances mentioned above, and

6. Whereas, The Airport and Airways Development Act of 1970 provides a means whereby funds are obtained from the air transportation system for the improvements and expansion of airports, which will then accommodate increased numbers of aircraft operations which may in turn increase the aircraft noise exposure in areas near these airports, and

7. Whereas, The noise exposure resulting from aircraft operations at many airports is higher than considered acceptable for residential land use, thus imposing a severe burden on those living in these high aircraft noise exposure areas, and

8. Whereas, The policy has been established by the various Government agencies, including DOT and HUD that air transportation must be handled as a system with the economic, social and health effects on the community under the takeoff and approach flight paths being given the same support and protection as the aircraft and airports, now

1. Therefore, be it resolved that Congress be petitioned to amend Public Law 91-258 (the Airport and Airway Development Act of 1970) by adding the provision that before any funds be made available for the improvement or expansion of an airport, funds be made available to the communities surrounding the airport to compensate landowners for damages due to high aircraft noise exposure, and further

2. Be it resolved that as a condition of this compensation the local governmental bodies shall establish zoning, building code ordinances, subdivision regulations, et cetera, which will prohibit the establishment of new nonconforming land uses in areas predicted to be subject to high aircraft noise exposure levels for the foreseeable future and will provide for the gradual conversion of land in the high aircraft noise exposure areas to conforming uses, and, further

3. Be it resolved that (1) a basis for compensation for constraints on the use of land in areas of high aircraft noise exposure levels, and (2) model zoning laws, building codes, ordinances and subdivision regulations be de-

veloped by the U.S. Department of Housing and Urban Development for use in implementing the legislation called for in 1 and 2 above.

Approved, this 19th day of May 1971.

RALPH G. CARO,
President.
JOHN C. VARBLE,
Secretary.
STANLEY W. OLSON,
Treasurer.

Mr. VARBLE. I would like to point out to these gentlemen, since I haven't seen many of these, I don't know if they have had the opportunity, I would like to close with a little story. At our symposium in Los Angeles, where the lady who spoke from Beverly Hills, and gave a very fine address, told us that they finally routed the planes for almost 6 months, and—rerouted the planes, and the gentleman from El Segundo jumped up and said, "No wonder we have all the noise down there, and now we would like to ship it back to Beverly Hills."

That is about it, gentlemen. I hope that we can accomplish something, and I think your office is our only hope to get it through. Look to us for the political help, please.

Dr. MEYER. Mr. Mayor, thank you very much. It has been a pleasure knowing you, and we would like to have that for the record. Before you go, might I ask if any of my fellow panelists could ask you a question, if they so desire?

Mr. VARBLE. How is your neck down there?

Dr. WHITCOMB. Doing much better, thanks.

Mr. VARBLE. Well, you have been most patient. I commend this panel. I know it has been tiring, a tiring 2 days for you, but again I say, if you had held it out in our area, just think, you would have had to recess every 5 minutes.

Mr. HINTON. I wish we had, John; your hospitality was magnificent.

Dr. MEYER. We welcome a visit with you, sir.

Mr. VARBLE. Thank you, sir.

Dr. MEYER. Now, might I ask if one of your neighbors and members of the executive branch of a neighbor community, if Mr. Herman Spahr, city manager of Park Ridge, Ill., will come up.

Mr. SPAHR. Thank you, Mr. Chairman.

STATEMENT OF HERMAN SPAHR, CITY MANAGER, PARK RIDGE, ILLINOIS

Mr. SPAHR. Air, noise, measurements and procedures.

The city of Park Ridge has been monitoring aircraft flights originating from O'Hare International Airport flying over the community since 1963. In 1963, Park Ridge adopted an ordinance which essentially provided that flights over portions of the city causing noise in excess of 95 decibels measured on a "C" weighting network are a nuisance.

To implement the provisions of the ordinance, noise measuring equipment was purchased. A bubble top truck was obtained in March 1962 to provide a mobile means of checking noise levels at various locations throughout the city. The truck was equipped with the sound measuring device and a radio capable of monitoring air traffic, and was designed so that visual observation of flying aircraft could be made conveniently.

This equipment is calibrated and checked for accuracy periodically in order that measurements may accurately reflect the degree of noise received on the ground. The sound truck and equipment is generally operated by a member of the Park Ridge Police Department who has received specific training in the use of the equipment.

Analysis of findings.—A review of the noise measurements taken during the past 7 years indicates as follows:

1. The overall average during the past 3 years ranged from 78 to 105 decibels measured on a "A" weighted scale.

2. The higher levels were present from 8 a.m.–10 a.m. and 4 p.m. to 6:30 p.m.

3. The areas of highest noise level were runways 9R–27L (south end of town) and 4–22 (northwest corner of town).

4. The highest frequency of aircraft flights is generally at the south side of Park Ridge between Higgins and Devon.

5. The average single noise duration is 20 seconds, and during high frequency periods, the duration is almost constant.

In addition to the measurements taken by Park Ridge, numerous additional observations and measurements have been taken in the Bensenville-Rosemont and Schiller Park area. These communities have joined together in a cooperative effort to determine noise levels in the airport communities surrounding O'Hare.

Lyle F. Yerges, consulting acoustical engineer, has been retained to evaluate the noise measuring program of the city. Mr. Yerges advises as follows:

> 1. The measurement techniques of Park Ridge officials are sufficiently good to permit us to use their data.
>
> Our own measurements indicate that the Park Ridge dBA data tend to run about 2 db high. As a result, in our statistical analysis of the accumulated Park Ridge data, we have arbitrarily reduced all of their measurements by 2½ dB. This means that we are on the safe side in drawing any conclusions from the collected data.
>
> 2. The Park Ridge data, and our own measurements in equivalent locations over the past 3 years, indicate that the areas of most severe noise complaints are subjected to noise levels of 85 dBA or over at least during one-third or more of the fly-overs on the principal east-west runway over O'Hare Plaza (the southeast corner of Park Ridge); similar or higher levels in other northeast-southwest runway; and, during other periods which elicit citizen complaints, to levels of 5 to 10 db higher than this.
>
> In simple terms, complaints appear completely justified since levels which evoke complaints are equal to or in excess of the 85 dBA critical or danger level.

At our request, Mr. Yerges has made an extensive study of available literature on hearing effects and damage from noise. He advises us that while it is difficult to find the type of dramatic unequivocal cause and effect results which would clearly indict noise as dangerous or damaging, it is difficult to find any authority who does not accept 85 dBA as potentially damaging, definitely annoying, interfering with speech communication, and a level unacceptable for normal human activities.

Our experts advise us that the level of 85 dBA is so firmly established as a critical and a most certainly dangerous or damaging level in all available literature, that it appears possible to build a substantial case around it.

It is our opinion and we believe that a simply, easily demonstrated case can be made to show that present aircraft operations at O'Hare already expose community areas to dangerous noise levels and that the proposed plans for additional runways at O'Hare will increase the exposure levels and the affected geographical area.

Effects of aircraft related noises on district 64 elementary schools: The education of children involves a communicative process of oral, audio, and visual faculties in various combinations for each of the areas of learning. The educational enterprise must, however, serve the community by performing the educational service so that it is readily available to the young and geographically accessible. Due to the encompassing circumstances necessary to serve the purposes of education, safety and convenience, the schools of Park Ridge-Niles district 64 find the inconsistency and high level of noise pollution attributable to the expansion and lack of pattern control at O'Hare International Airport becoming increasingly less tolerant in the educational setting.

Four of the district's 12 schools occupy positions within close proximity to the landing and takeoff corridors resulting from the placement of O'Hare runways. Observations, questions, and suggestions from the administration and staff of several elementary schools—Edison, Merrill, Franklin, and Madison—were sought in response to the problems created by the noises.

In general it was determined that modifications in the teachers' approach to instruction are necessary. Given the different modes of communication as oral, auditory, and visual, and the necessity of the communication in the education process, teachers have had to vary the approach according to the noise level. Particularly where a combination of verbal and auditory faculties are needed, the teacher is forced either to shout or, by preference, to discontinue communication until the noise subsides. Valuable instructional time is lost and crucial learning activities reaching an apex are set adrift as concentration is broken and young minds wander to the source.

The subject areas most often affected are those involving discussion and oral presentation. This would include a majority of the pupil-teacher and pupil-pupil communications necessary to instruction in the education process.

Some areas particularly affected by the noise are reading, social studies, and language arts, the major subject matter areas.

In attempts at ascertaining the periods during which flights are most disruptive and require modifying the teachers' approach or presentation, efforts have been thwarted by the inconsistency of the flight pattern. That is to say that the intervals between planes have been observed to be intermittent while the takeoff and landing directions tend to be irregular with some planes flying directly overhead, other along somewhat defined corridors like the Kennedy Expressway.

Seasons of the year when windows are wide open or even narrowly cracked and when physical education classes are outside, generally spring and autumn, are the times when instruction and the learning process are most often disrupted.

Outside physical education classes must be instructed before, after, or between flights at some schools, due to the noise factor. When classroom windows are open for ventilation purposes, the noise presents a continual interruption and requires visually oriented presentations, worksheets, and individual practice.

During the bimonthly meeting of the board of education in district 64, noise pollution like that in the school day has been experienced. In point of fact, meetings scheduled for Edison School on the second and fourth Tuesdays during the spring and summer of 1968 were changed to another location for this reason.

Similarly, meetings held in the autumn of 1970 were interfered with by the noise of passing flights to the extent that the board member or other persons speaking stopped until the noise had subsided sufficiently so that they could be heard. In relation to this, the board of education submitted letters opposing the further expansion of O'Hare International Airport to the airport authorities and to the city council of Park Ridge.

The noise pollution problem has been recognized by the parent organizations of the neighborhood schools and they in turn have sent expressions of their feelings to the local school board, city, State, and Federal governmental bodies in this regard.

It is apparent that the schools have no solution to this problem. It is deemed one which requires knowledge of aerodynamics and equipment performance, a field in which we contribute only the tools for learning. However, in behalf of the students and teachers of Park Ridge-Niles district 64, we submit that we are making every effort to perform our function within the environmental circumstances, and we further submit that the noise level can be contained within more reasonable limits if efforts in this direction are undertaken.

Evaluation of noise findings and suggested approach to measure noise levels: Mr. Yerges, our consulting acoustical engineer, advises us that all studies and all known forecast methods clearly and unequivocably forecast an increase in the areas affected by such levels and subjected to them, and all studies appear to confirm that levels in presently complaining areas will increase, particularly if the new proposed southwest-northeast runway at Chicago International Airport is put into operations.

In other words, it is our opinion in consulting with our experts that present areas will be increasingly subjected to noise of equal or higher levels than that reported today and additional areas will be subject to noise to at least the noise of the level now experienced in the presently complaining areas.

We are basically concerned with the establishment of noise levels realistically designed to protect our residents from dangerous and damaging noise exposure.

Mr. Yerges, at our request, has evaluated the various proposed noise measuring and rating systems of the State of California, the Illinois Pollution Control Board and Inglewood, Calif. Mr. Yerges reports to us as follows:

> (a) We are always dubious about such complex procedures, involving expensive and complex equipment, calculations, et cetera. Such procedures always suggest the need for true experts to accomplish the procedures and make the measurements. This enormously weakens the ability of ordinary enforcement personnel or operating personnel to control the problem—so they tend to ignore it.
>
> As far back as 1955 the city of Milwaukee even considered a simple 90 dBA top limit for truck noise at the street curb to be too complex to enforce, since it "* * * required every policeman to handle and be able to use correctly * * *" a simple sound level meter. The proposed CNEL, et cetera, procedures may terrify even a sophisticated enforcement group.
>
> (b) We are always suspicious of averages or summations which tend to smooth and disguise peaks and significant short-term phonomena. As we

> said, it is much like the man who drowns crossing the river of average depth of 18 inches.
>
> The integration or averaging method, even when under the program of a well-designed data-gathering array of equipment, assumes too much. Several short-term noise peaks, spaced many minutes (or even hours) apart can be most annoying and distasteful—real nuisances—while the average or integrated level may be quite low. We usually find ourselves disturbed and annoyed and districted for several minutes following a disturbing incident, however short lived it may be.
>
> In a word, the averaging or integration method may only obfuscate and disguise the real seriousness or effects of the noise incidents.
>
> (c) The proposed procedures do not seem to take into consideration the seasonal or weather-oriented aspects of the problem. The average annual levels still do not recognize that, in temperate climates, people live out-of-doors in late spring, summer, and early autumn. We can't enclose or air condition our yards or our outdoors recreation areas so we will suffer considerable annoyance whenever outside of our homes, in spite of having well sound-conditioned homes with fixed double-glazed windows and air conditioning.
>
> In short, the degradation of our natural environment by overflights is not really reflected in most of the figures. Perhaps it is felt that sleep, communication, and such activities are the only important considerations; but suburban life includes the out-of-doors, too.
>
> (d) From over 30 years' experience with the type of measuring equipment and procedures specified, we cannot disguise our serious doubts about the whole complex situation proposed. The equipment is sensitive, delicate, expensive, subject to damage, constantly in need of calibration, et cetera. We can see legal counsel for an airlines or airport operator literally throwing any valid complaint out of court if it is based upon the automatic data-gathering equipment, without constant or continuous supervision of some competent human.

After discussing the matter with our experts and reviewing our own noise monitoring procedures, it is our opinion that much of the proposed procedure in the California statute and ordinance and in the proposed standards of the Illinois Pollution Control Board are really unnecessary.

From the airport location, prevailing winds, neighborhood layout and geography and types of equipment operated, we are able to predict quite accurately what exposure will be anticipated anywhere in a given community on the basis of the operating procedures for the particular aircraft. They must travel a known path, at a known height, under known power settings.

Thus, we know in advance what to expect under almost any flight path. Therefore, the "Noise Impact Areas and Noise Impact Boundaries" can be reasonably predicted which is, of course, made clear in the proposed ordinances and standards. Why not, then, simply insist that within each outlined area, no overflight shall cause a sound level to exceed some reasonable dBA figure?

After all, this, in its naive simplicity, accomplishes precisely what is included in all of the other complex procedures.

On this basis, an intelligent officer or operator with a simple, low cost sound level meter, can check and determine at any given time whether there are violations. In other words, what is wrong with what Park Ridge is doing now?

If automation is required, it would be simple to locate an automatic level recorder at each boundary line to trigger with any excess noise, record the time, and make identification of the offending aircraft.

It is our opinion that we do not need the complex averaging equipment and procedures; that they accomplish little or nothing, not better accomplished by more simpler approaches. Further, it precludes the game of integration, summation, or averaging—a potential method of continual controversy or manipulation.

While Yerges, in this respect, reports to us as follows:

> It is his opinion and he believes that "pilots, airport operators, municipal law enforcement officers, and all personnel involved in this aircraft noise problem should be able to understand, measure, and evaluate, as well as control, the controllable and measurable factors. Only then can we expect them to cooperate to mitigate the noise problem and abate the nuisance of noise. We must avoid designing a new and interesting 'game' of 'beat the meter' inherent in the proposed ordinances and standards—a temptation too appealing to ignore, as we see it."

The city of Inglewood ordinance makes a great deal of sense in its inherent simplicity and philosophy. It might be a bit too lenient, but it is the type of code which will likely stand court tests and challenges; and it should appreciably control noise nuisance, if enforced. With some editing, it could be made most acceptable.

To summarize our position in reference to any proposed standards, our comments are as follows:

1. Well established criteria include some means of limiting noise at any time, even for short duration, to 85 dBA maximum. Energy averaging or similar integration procedures probably do tend to predict hearing damage, but they do not define annoyance, nuisance, or other subjective effects.

2. It is simple to measure noise levels in dBA with simple, low cost equipment, which can be operated by competent law enforcement personnel; or to automate such measurement quite simply.

3. It is simple to forecast noise exposures on the ground whenever airport configuration and aircraft type and operational procedures are known. Thus, it is possible, without any measurement procedure at all, to establish the operating parameters of aircraft, the airport layout (especially runway direction and orientation), and to determine zoning areas near the airport in advance.

This would tend to preclude the need for much of the proposed complex measuring procedure; and it would go a long way toward avoiding the nuisance of noise.

Dr. MEYER. Thank you very much, sir. I gather from the thrust of your statement here that part of the problem are the many different, and someimes extremely complicated, procedures for specifying noise measurements——

Mr. SPAHR. That's correct, right.

Dr. MEYER. And that you are making a strong plea for some uniformly acceptable, relatively readily understandable approaches.

Mr. SPAHR. Yes, and we realize that any standards that are established will require someone to enforce them, and local municipalities normally do not have acoustical engineers on their staff. It must be something that can be readily measured, and a determination made as to whether or not violations have occurred. Our consultant feels that a dBA standard suggesting 85, in particular, is an appropriate one, and one that can easily be determined with relatively inexpensive and easily operated equipment.

Dr. MEYER. Panel?

Mr. HINTON. Mr. Spahr, I know—I knew your predecessor very well, Jim Galloway, as we both served on the President's White House Panel on Aircraft Noise. I would like to endorse your comments regarding measurement techniques that you have described. I would like to ask you one question with regard to the monitoring.

Can you attribute to the use of monitoring equipment by Park Ridge any measurable relief, either from aircraft or from surface noise sources from the use of your equipment?

Mr. **Spahr.** The city of Park Ridge has never issued any violations based on its existing ordinance. At this time the measurements that we do, or are continuing to accumulate, are used pretty much to build a case as to the violation. We have made no effort at his point to bring any of the airports or airlines into a court on a specific action of a particular flight flying over the city of Park Ridge.

Mr. **Hinton.** It's quite apparent that your ability to measure noise does not include an ability to conrol the noise.

Mr. **Spahr.** Yes, right.

Dr. **Meyer.** Thank you very much, sir.

I would now like to ask Mr. George Dayiantis of the Far Northwest Community Association, who is among those who have also been very patient, to come forward.

STATEMENT OF GEORGE DAYIANTIS, FAR NORTHWEST COMMUNITY ASSOCIATION

Mr. **Dayiantis.** Our membership is directly affected by the dangerous level of noise pollution which is caused by the jets using O'Hare. I had some misgivings relative to appearing before this committee today, for it appears that there are three conditions existing which have caused the public to show little interest in public hearings.

One, the hearings are too often held away from the location of the problem. The hearing should have been held in our community of the 41st ward; Taft High School would have been an ideal location. The noise pollution would have been most obvious.

Two, nothing will be done unless it has political overtones, or some serious mishap occurs.

Three, hearings are held to allow citizens to release their frustrations.

I would like to digress because by the way Dr. Meyer and the rest of the panelists have acted, it appears that we have a receptive group of men, and I am looking forward to some action. With these conditions as prerequisites to one's involvement, people have become apathetic. I doubt if this is the goal of a democratic society.

With over 200 organizations in our area, there is a meager representation at these hearings, and that is the reason I listed those three; people have become quite depressed.

Dr. Meyer, I wonder if our Federal and State legislators and city council members sincerely care about the health and welfare of the citizenry. Do they really care about the hazard to the unborn? For it has been in some scientific publications expressed that there is a possibility for noise pollution causing some damage to the unborn.

Normal communication in homes is difficult to maintain, if at all. Homes suffer damage, both inside and out. Schools in the area have difficulty functioning properly. Is this the price we must pay for our technological advancement in our desire to speed from one place to another? Installation of necessary noise control devices must become a reality.

Ironically, tax money through Federal support is being used to subsidize this noise pollution. We realize flight schedules are planned for convenience, but to provide this for the minority at the expense of the health and safety of the majority is inconsistent. Here I would add, if you and I have a son or daughter and they were requested to write a report by their respective teachers, and they wanted them to write this report on noise pollution, the causes and the solutions, would we accept some of the excuses that are being offered today?

I only hope that these hearings are not an exercise in futility for those most adversely affected by the noise, and I would like—I hope I am not putting you on the spot, Dr. Meyer, but you, as the chairman of this most worthwhile group, I hope that you will continually and publicly state that the time is now, that measures must be implemented now to control the noise by jets, and from any other sources if we are to be able to live in a society that we would want for ourselves and our future generations. Thank you very much.

Dr. MEYER. Thank you, sir, and I appreciate your comments regarding hearings; I can assure you this one is one in which we are trying to get information with which to do something.

Mr. DAYIANTIS. Thank you.

Dr. MEYER. I think you have given a lot of food for thought for some of my colleagues in all levels of government. Thank you very much for being so forthright, sir.

Mr. DAYIANTIS. Thank you.

Dr. MEYER. We are, as you know, running somewhat behind schedule here for a variety of reasons, and as I look at the list of prospective speakers I see we still have Elizabeth Lewis, representing the Northwestern Students for a Better Environment; Mrs. Laura Fermi; Areta Psyk; Georgia Horowitz; Mr. Omar Marcus; Richard Blomberg; Ted Decca; Tom Hamilton; John Kerrigan; Wendell P. Berwick; some representatives of the Brotherhood of Railroad Signalmen; and Mr. Vernon Lindahl. I intend to take people in that order and, as I said, there were some reasons why some of these folks had to make specific changes.

As I said, I am determined to hear from everybody, because they have asked to be here, and it is my job. And as I have also indicated, in each of these presentations we learn something of great use to us, so if Elizabeth Lewis would please come up, I will be delighted to hear from her, as will the rest of the panel.

Miss LEWIS Thank you.

Dr. MEYER. You have been a patient young lady.

STATEMENT OF ELIZABETH LEWIS, NORTHWESTERN STUDENTS FOR A BETTER ENVIRONMENT

Miss LEWIS. This statement is based on information presented in volume I and in preliminary drafts to volume II of a study entitled "Comprehensive Plan for the North Lakeview Section of the Uptown Model Cities Area."

This study, financed by grants from the Sloan Foundation and the National Science Foundation, was undertaken by students working through the Urban Systems Engineering Center and the Design and Development Center both at Northwestern University.

Noise pollution in North Lakeview affects many patterns of human existence. But, its effects on safety and education are the most disturbing.

Several crossing guards were interviewed for this study. One said, "The kids cannot hear me; they watch my gloves for directions." It was observed that children could not hear approaching cars and that noise from the elevated trains of the CTA frightened them. But the physical danger of crossing these streets, though real, is brief. A much more serious danger with many unknown effects is disruption of the classrooms by the noise polluters.

At Greeley Elementary School, noise levels hurt the educational process. The back side of the school faces the elevated. CTA noise disrupts classes on all three floors of the school on the side facing the rapid transit tracks. Classrooms on the opposite side of the building are not disrupted. When windows were left open on the side next to the tracks, meters recorded train noise levels at or above 90 dBA levels. When warm weather approaches, the teachers will be faced with the cruel dilemma of either closing the windows and enduring the heat or opening the windows and enduring the noise.

The following noise levels were recorded at Greeley:

Playground: 102 to 106 dBA.

Third floor room (back side of building): 90 to 94 dBA with windows open and 70 to 78 dBA with windows closed.

Second floor room (front): 84 dBA with windows open, 70 dBA with windows closed.

Library (which is under the gym): 88 to 90 dBA, since the gym contributed to the disruptive sound.

In addition noise pollution is a result of street traffic. Ambient noise levels in other parts of the study area are as follows:

Seminary-Eddy: 75 to 85 dBA, Racine-Clark: 80 to 85 dBA.

Clark and Irving Park: 80 to 90 dBA, Addison and Sheffield: 80 to 90 dBA.

Clark and Addison: 80 to 90 dBA, Irving Park and Sheridan: 100 to 105 dBA.

NSBE makes the following recommendations in light of the preceding comments about the level of noise generated in one Chicago community area.

The Walsh-Healy Act should be amended so workers are better protected from hazardous noise levels. The present law allows 90 dBA levels for an 8 hour duration. But, auditory damage will occur at this noise intensity level.

NSBE recommends the adoption of 80 dBA, as proposed by the New York State quiet communities program, as a maximum level for prolonged periods. Thus, the amended Federal Level Act would require 80 dBA maximum for an 8 hour period and not 90 dBA as at present.

Also the Walsh-Healy Act is too limited in scope. The act covers only those employed by companies holding Federal contracts in excess of $10,000. Amendments should be added to control noise in areas where such levels present health hazards.

Second, EPA should adopt sound transmission class levels. The STC level is the level of sound which building materials baffle. If a measurement outside a building is 100 dBA while the meter records 60 dBA in the building, then the building has an STC level of 40. Oak Park, a Chicago suburb, has a code that could serve as a model for establishing STC levels. The specific section is 81.2a of the Oak Park noise pollution ordinance.

EPA should adopt STC levels for building materials that will reduce noise levels below the 80 dBA level.

Third, EPA should perform additional research on the effectiveness of baffles and concrete supports which are used for noise abatement around CTA tracks.

Preliminary results from tests which NU's students performed on baffles and concrete supports show these modifications have negligible effects on the dBA levels. Peak levels of 98 to 99 dBA were recorded both with and without concrete supports and baffles. These supports, line both sides of a quarter mile stretch of the Englewood Rapid Transit line from Ashland to Racine. The cost for these baffles is $33 per lineal foot. The overall cost for baffle material alone on this stretch of track is $86,000.

Finally, a new friction reducing compound should be developed. This compound will help reduce noise resulting from rail-wheel interaction on the elevated tracks. Replacing existing track to reduce noise levels would be expensive. A practical means of reducing such noise would be development of a noise abating coating that could be applied to the wheels of a train and/or track.

Correspondence with the Dow Chemical Co. indicates this may be an innovative means of reducing noise. Also, a Dow representative says development of a product with the desired qualities of abrasion resistance and adhesion may be technically feasible. A demonstration grant from the Federal Government may lead to an inexpensive means of reducing decibel levels.

The Following Statement Was Prepared for the Noise Pollution Hearings Sponsored by The Federal Environmental Protection Agency on July 28 and 29, 1971 at the Sheraton-Chicago Hotel, Chicago, Ill.

I. INTRODUCTION

We are happy to acknowledge that most of the information to be presented was culled from the environmental control section of volume I and the preliminary draft to volume II of the Comprehensive Plan for the North Lakeview Section of the Uptown Model Cities Area.

These volumes are the result of a study performed under support from a Sloan Foundation grant to the Design and Development Center of Northwestern University and a National Science Foundation grant to the Urban Systems Engineering Center of Northwestern University. References from other sources are cited as they appear.

II. EXAMPLES OF LEVELS OF NOISE POLLUTION IN THE NORTH LAKEVIEW AREA

Noise pollution in North Lakeview has broad effects on four areas of life within the study area: (1) domestic, (2) business, (3) safety, and (4) education.

1. Domestic.—Domestic tranquility is virtually nonexistent in many homes near the CTA elevated train tracks. One resident who has lived in the 3400 block of Sheffield for 7 years stated, "The trains rock the whole apartment, disrupt television reception, sleep, and communication." Her family is "used to the noise now, but it took some time before they were." A passing train registered 85–95 dBA inside their apartment.

A 48-year resident of that same block revealed that noise is especially bad after a rain, which cleans oil and grease from the rails of the elevated, leaving them dry and increasing friction. The resulting noise is intolerable even to a veteran: "I am used to it, but after a rain it really gets on my nerves." He also noted that rent and CTA noise levels do not have the expected negative correlation. A 100 dBA level, which he deemed comparatively "quiet" was recorded at 11 a.m. in his garage.

In the 1000 block of Roscoe Street, a resident whose bed is situated 3 feet from the elevated tracks said, "You have to sit there to believe it. You think it's coming right through the room. I have to get awfully tired to sleep." Trains passing registered 105 dBA at 11 a.m.

2. Business.—To examine the effect of noise on business, several merchants were interviewed. A watchmaker on Sheffield said he was "used to it," but he could not talk to his customers over the noise from the trains. These comments were representative of the merchants who were interviewed.

Medical facilities were also affected. At the medical building at 3355 North Clark and the Clinic Hispana at 3934 Sheridan, both situated under the tracks of the CTA, readings of 100 to 108 dBA were recorded outside the buildings.

A secretary to the alderman of the 44th ward was interviewed at the Clark Street Democratic Organization office. He claimed speakers must pause during speeches because they cannot be heard over the passing elevated's noise. An 80 dBA reading was recorded at this hall.

3. Safety.—The safety threat of loud distractions was made clear by a city of Chicago crossing guard: "The kids cannot hear me; they must watch my white gloves for directions." The children cannot hear approaching cars, and the noise of the elevated obviously frightens them.

The crossing guard felt that this situation was especially dangerous for younger children. Of course, the previously mentioned threat of high noise levels to the hearing capacities of all residents who live, work or attend school or do business in proximity to the elevated is a constant danger to health and safety.

4. Education.—At Greeley Elementary School it is evident that noise levels interfere with education. The back side of the school faces the elevated, and CTA noise in classrooms on this side of all three floors force temporary pauses in class procedure. Classrooms on the front side of the structure are not upset. With windows open on the back side, classrooms were totally engulfed in 90 dBA noise levels, causing considerable distraction. The warm weather will accentuate this problem because windows must then be kept open. The following noise levels were recorded at Greeley:

Playground: 102 to 106 dBA; third floor room (back): 90 to 94 dBA with window open and 70 to 78 dBA with window closed; second floor room (front): 84 dBA with window open, 70 dBA with window closed; and library (under gym): 88 to 90 dBA.

Thus Greeley has an additional, unique noise problem: the gymnasium is located directly above the library. A fast break in a basketball game above registered a very disturbing 88 to 90 dBA level in the library.

Teachers interviewed all agreed that the elevated seriously disrupts the educational process. Disruption is much greater with windows open and on the side of the building adjoining the elevated—as one might expect. Distressingly, the library is also incredibly noisy for purposes of concentration.

In addition to the preceding, other noise pollution in the area is almost entirely a result of street traffic, with busy intersections being the trouble spots. Ambient noise levels in other parts of the study area are shown below:

Seminary-Eddy: 75 to 85 dBA; Racine-Clark: 80 to 85 dBA; Clark and Irving Park: 80 to 90 dBA; Addison and Sheffield: 80 to 85 dBA; Clark-Addison: 80 to 90 dBA; 3527 North Clark: 90 dBA; and Irving Park-Sheridan: 100 to 105 dBA.

For the sake of comparison a chart of noise levels from common sounds is attached as appendix A.

III. NOISE AND HEALTH HAZARDS

It has long been known that sound can cause physiological and psychological reactions. Unfortunately, some of these reactions pose health hazards. In the light of the previously mentioned data, the following three comments strongly suggest that dangerous levels of noise are becoming the norm rather than the exception:

1. In his remarks to the Air Pollution Control Association in 1966, Dr. William H. Stewart, Surgeon General, U.S. Public Health Service, said: "It has been shown that prolonged exposure to 85 decibels and above (approximately the level of heavy traffic from 50 feet away) will induce permanent loss of hearing; first at high frequency, then gradually toward the range of human speech." Further research indicates a positive correlation between noise and increased malfunction of the heart, endocrine system, and reproductive system. Noise is even thought to affect the unborn fetus.

2. According to Prof. Edward R. Hermann of Northwestern University, "Noise that masks or interferes with essential speech communication in dangerous situations constitutes an obvious hazard." This situation occurs frequently, especially near the elevated tracks. Referring to 140 to 145-decibel noise levels, Hermann comments that, "Slight or short term exposure

causes slight but permanent threshold shifts, which are irreversible and cumulative, i.e. causing sensori-neural hearing loss."

3. In his presentation to the American Public Health Association, "Quiet Communities for New York," given in 1970, Dwight F. Metzler, Deputy Commissioner of the New York State Department of Environmental Conservation said that, "Ninety dBA can produce a physical reaction related to the development of cardiovascular disease." Further on in his paper, he writes, "At this time, it would appear that a goal of about 80 dBA be established as a maximum exposure limit to prevent hearing damage. Even at this level a small percentage of the people having particularly sensitive hearing may suffer hearing loss from prolonged exposure."

IV. RECOMMENDATIONS

1. Changes in the Walsh-Healy Public Contracts Act

The Walsh-Healy Act should be amended so workers are better protected from hazardous noise levels. The present law allows 90 dBA levels for an 8-hour duration. But, auditory damage can frequently occur at this measure of noise intensity level. NSBE recommends that 80 dBA, as proposed by the New York State Department of Conservation for their quiet communities program, be adopted, as the Federal maximum noise standard for an 8-hour period. Thus, the amended Walsh-Healy Act would then allow a maximum of 80 dBA, not the present 90 dBA, as the 8-hour duration noise level. Of course, the other exposure levels and their durations would be appropriately amended to reflect this change.

Also, the Walsh-Healy Act is too limited in scope. That act covers only those employed by companies holding Federal contracts valued at or above $10,000. Amendments should be added to control noise in all areas and all conditions where such levels present health hazards.

2. Adoption of sound transmission class levels

EPA should adopt sound transmission class levels. The STC rating is the level of sound which building materials block. For example, if a meter measurement outside a building is 100 dBA, with the meter recording 60 dBA inside the building, then the building has an STC rating of 40. Oak Park, a Chicago suburb, has a code that could serve as a model for establishing STC ratings for building materials. The specific section is 81.2a of the Oak Park Noise Pollution Ordinance.

NSBE suggests that EPA adopt STC ratings for building materials that will reduce noise levels below the 80 dBA; particularly in noisy metropolitan areas.

3. Additional research on baffles and concrete supports used to abate noise

EPA should perform additional research on the effectiveness of baffles and concrete supports suggested for noise abatement around rail mass transit systems. Preliminary results from tests which Northwestern University students performed on baffles and concrete supports erected on the Englewood extension of the CTA elevated for the purpose of noise attenuation indicate that these modifications presently have negligible effects on dBA levels. Peak levels of 98 to 99 dBA were recorded both with and without concrete supports and baffles. These structures, at the time of testing, lined both sides of a quarter mile stretch of the Englewood Rapid Transit Line from Ashland to Racine. The cost for these baffles was estimated at $33 per lineal foot. Thus, the overall cost for baffle material alone on this stretch of track is over $86,000.

4. Development of a friction reducing compound

A new friction reducing compound should be developed. This compound will help reduce noise resulting from rail-wheel interaction on the CTA tracks. Replacing existing tracks or wheels to reduce noise levels would be expensive. A more economical means of reducing such noise could be the development of a noise abating coating that could be applied to the wheels and/or track. Correspondence with the Dow Chemical Co. indicates this may be an innovative means of reducing noise. Also, a Dow representative says that development of a product with the desired qualities of abrasion resistance and adhesion may be technically feasible. Given the known ingenuity of American chemical companies, a demonstration grant from the Federal Government could lead to an inexpensive means of reducing decibel levels.

This statement was prepared by:

Douglas Rathe, senior in the School of Journalism at Northwestern University, past president of NSBE.

Steven Newman, senior in the co-op program of the Department of Electrical Engineering at Northwestern University, member of the environmental control team of the uptown study group, member of NSBE.

Ronald Eng, graduate student in the Ph. D. program in biomedical engineering at Northwestern University, member of the executive committee of NSBE, member of the region V SCOPE council of the Federal EPA.

Thanks are extended to Prof. Martin Wachs, urban planning section of civil engineering, and to Prof. Gustave Rath, director of the Design and Development Center, for their help in the preparation of this statement.[*]

Miss **Lewis**. I will try to answer questions; if I can't, I will relay them to the men that did this study.

Dr. **Meyer**. Very good.

Mr. **Hinton**. I would like to ask you one question, Miss Lewis. First I would like to commend you on your statement, and I would like to thank you for bringing to our attention the existence of a model building code which requires exterior wall STC criteria. This is a relatively rare thing. I don't know where else it's done. Thank you.

Miss **Lewis**. You are welcome.

Dr. **Meyer**. We are trying to obtain a lot of information regarding noise conditions in different places, and receiving information on a study like this would be most valuable to those of us who are working on the report to Congress. I am trying to get as much information of valid measurements and different types of locations, and this is an important contribution, plus the information you have given about this noise reduction coefficient. I will look into this further. Thank you very much.

Miss **Lewis**. Thank you very much.

Dr. **Meyer**. Proceeding next in accordance with our schedule is Mrs. Laura Fermi of the Cleaner Air Committee of Hyde Park-Kenwood. If she is still here I would be most pleased to have her.

STATEMENT OF LAURA FERMI, CLEANER AIR COMMITTEE OF HYDE PARK

Mrs. **Fermi**. My name is Laura Fermi; I represent the Cleaner Air Committee of Hyde Park and Kenwood. That is a neighborhood around the University of Illinois. Our committee has worked 12 years toward abatement of air pollution, but we are also increasingly aware of other environment problems, particularly of rising levels of city noises.

We wish to call you attention to some sources of noise which may not be as obvious as heavy automobile traffic or airplanes, but which nonetheless have affected us within our neighborhood, not downtown noise. These sources are large delivery trucks and trailer trucks in residential sections, especially when they go back and forth to make a turn; garbage pickup trucks with unnecessarily noisy grinding devices. Sometimes they drive long stretches between pickups with their grinding devices on, and we can hear there is nothing inside them; trains, there are the freight trains of the Illinois Central at night, they are very noisy.

Then the South Chicago subway, inside which the noise is above the danger level, in our opinion. The elevated trains whose metal wheels squeak against the metal rails, and we suggest that some other kinds of tires be required. Then motorcycles, especially if driven by youngsters. Construction machinery, especially pneumatic drills, and then even noisier than the construction machinery is, are the machines which fell and chop up trees. We live near a park, and that happens quite often. Power lawn mowers; improperly adjusted air conditioners.

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[*] Supporting material for this testimony is on file at the Office of Noise Abatement and Control.

Our group is a conservationist group, and we try not to run air conditioners too much, to save on electricity, but often at night we have to run our air conditioners only to protect ourselves from a neighbor's too noisy air conditioner.

Much too loud music and announcements from public address systems, both in closed spaces and in the streets.

Drumming and singing in public parks later at night than should be reasonable, and the same drumming for too long periods, in shopping centers where they upset the shopkeepers. You know, they can't get away, they can try—we can try and get away, but they can't.

We have noticed that noise travels along strange paths. It shifts direction on our big buildings, and it is louder when it reaches the upper floors than at street levels, especially this drumming.

I have had the experience myself that I went down to the street and I could hardly hear it, and up at my floor level, which is the 15th, it's very strong. It seems to come from the south when the players are on the east side.

If a study of noise paths and causes of noise amplification has not yet been made, we recommend that it be undertaken now.

As for household appliances, we often hear the statement that we, the consumers, demand more and more powerful, and therefore noisier appliances. In reality we seldom have any choice. For instance, my own new dishwasher runs, and the floor makes noise and therefore makes noise over three times as much as my previous dishwasher, which was 22 years old. To my knowledge it is not possible to buy now a dishwasher that does the job in 12 minutes.

Finally we would like to point out the noise due to poor acoustics of certain rooms. It may not result in deafness, perhaps, but it's terribly tiresome and irritating.

There is a building in Hyde Park where I have vowed I will never go to parties there. It gets too noisy. Thank you very much.

Dr. MEYER. Mrs. Fermi, thank you for reminding us that we have a lot of problems besides automobiles and airplanes. And the problem that you mentioned about the noise seeming louder at the 15th floor than at the surface, and not in the same direction, is one that is causing a lot of concern, because in big cities with tall buildings there is this bouncing around of the noise, as you aptly describe. And sometimes the reflection and the building up of noise from several sources does cause this problem. It's one that we are going to look at very seriously. Panel, any questions? Thank you very much.

Dr. MEYER. Is Areta Psyk here? Perhaps I am pronouncing it wrong. I think I know my languages fairly well, but it's P-s-y-k, of the Oak Park Campaign Against Pollution. If not, Jo Ann Horowitz, who is the Illinois chairman of the beleaguered earth program of the American Association of Women.

STATEMENT OF JO ANN HOROWITZ, AMERICAN ASSOCIATION OF UNIVERSITY WOMEN

Mrs. HOROWITZ. Mr. Chairman, gentlemen of the panel, and concerned citizens: I am Jo Ann Horowitz, 5818 West Montrose Avenue, Chicago, Ill., 1971–1973 this beleaguered earth topic chairman, Illinois division, American Association of University Women.

I would like to present the first vice president of the Illinois division, Mrs. Mary Eleanor Wall, who is with me this afternoon. This association is a national women volunteer organization with 170,000 members located in 1,681 branches throughout the country as well as members-at-large. The Illinois division of the American Association of University Women has 74 branches with nearly 9,000 members. I have with me the prepared testimony from the members of our northwest suburban branch, which I will not read but offer as additional testimony appropriate to this hearing.

Dr. MEYER. It will be inserted in the record following your testimony.

Mrs. HOROWITZ. Thank you. The AAUW is interested in a variety of concerns and for the past 2 years two of our topic areas for study and action have been "This Beleaguered Earth—Can Man Survive?" and "The Human Use of Urban Space." We have chosen to continue with "This Beleaguered Earth" topic in the next biennium because of our concern in the environmental quality of our community and of our Nation. Ways must be found to conserve our environment, our normal state of mind, our physical and mental health, and even our lives by reducing noise.

It would seem that in homes, schools, and places of business and industry, noise can be reduced. Noise levels in a house are greatly increased with the sounds of televisions, radios, record players, and increased usage of a variety of electric motors and appliances.

Wall partitions are flimsy and allow sounds to penetrate the whole home. Less than 10 years ago I lived in a newly built apartment building in Chicago and could hear the people in the adjacent apartment dial the telephone there. Especially annoying is the sound of running water through the pipes of another apartment when one is trying to find sleep and rest in his own quarters.

Many people on hot nights are expected not to use their air conditioners out of consideration for neighbors who cannot sleep because of the noisy motor which was just bought at a modern appliance store.

Researchers in Switzerland, West Germany, and Canada have found in studies on sleeping subjects that the noises of nearby motor traffic, or of a radio or television in the next room can affect sleep. The noise does this by lifting the sleeper from a deeper to a shallower phase of sleep.

During their working day people deprived of deep sleep can be irritable and cranky, feel tired, have daydreams, and be mentally disorganized. Lack of proper sleep reduces people's ability to cope with ordinary frustrations and robs them of their sense of humor.

Whether or not they live in noisy homes, people often work in noisy surroundings. A study of steelworkers in West Germany found that workers exposed to noise on the job had twice as many family problems as did similar men who worked in quieter surroundings. This study found that men who worked in noisy conditions were more aggressive, distrustful, and even paranoiac than were similar men who worked in unsimilar—quieter—circumstances. The noise-exposed workers also were far more likely to quarrel constantly with their foremen. AAUW has equal concern for the sounds of transportation vehicles which we surely must have the technology to reduce such as automobiles, motorcycles, buses, subway trains, and airplanes.

Noise can be especially harmful to persons already under other kinds of stress and can lower their ability to cope with their emotional problems. A 1969 English study showed that people in the noisy environment near London's Heathrow Airport suffered a higher incidence of mental illness than did people who lived in quieter environments some miles away. Because of the heavy use of O'Hare Airport and the great amount of traffic to and from this airport, we urge no further expansion of O'Hare Airport.

Princeton University psychology professor, Silvan S. Tomkins, believes that in our society noise is a constant terrorizer and that this constant stimulus of stress is as unnatural a state as perpetual hunger would be, since both of these are incompatible with optimal existence.

We urge that the site for a third major airport in the Chicago area be established soon. The determination of this location would go a long way in reducing the anxiety level of many citizens. Because of our concern for this beleaguered earth, we believe that this new airport should not be built in Lake Michigan for it will destroy the lake ecologically.

City planner and Chicago State College professor, Frederick Blum, has reported that Lake Michigan is only ten years away from being as dead as Lake Erie. Lake Michigan is this area's greatest natural resource and source of beauty. It should not be defaced and used as a receptacle into which things can be dumped and built.

There have been no reports of an environmental study on what would be the ecological impact of constructing and having an airport in Lake Michigan.

State Representative Robert Mann believes the thought of building an airport in Lake Michigan jeopardizes the way of life for everyone living on the South Shore and that this part of Chicago is in danger of becoming a residential desert. He feels, as so many of us do, that human values of urban life are important too.

Noise pollution has been an annoyance, a bother, and a threat to human beings for too long a time. Ironically, noise has been the quiet pollution, the one not talked about. We commend the Environmental Protection Agency for its willingness and concern to exercise control in this area. We urge legislation to give this Agency the legal weapons to fight noise pollution.

We appreciate opportunities such as this to communicate our opinions about doing something to lower the volume control on the threatening and dangerous noises of this beleaguered earth. Thank you.

Dr. **MEYER**. Thank you, and thank you for reminding us that one of the problems we are faced with in dealing with noise is not only that of hearing or nuisance, in effect, on communications, but also sleep, which is one of its really major nonauditory problems. Panel? No questions? Thank you, Mrs. Horowitz, for coming and being so patient.

(The statement referred to above is as follows:)

Statement by the Northwest Suburban Illinois Branch, Illinois Division, American Association of University Women to the Environmental Protection Agency, July 29, 1971, Sheraton-Chicago Hotel, Chicago, Ill.

Statement prepared by Mrs. S. J. Loska, 1694 Van Buren, Des Plaines, Ill., president 1969–1972, of the Northwest Suburban Illinois Branch, AAUW.

Mr. Chairman and members of the Environmental Protection Agency:

During the past 2 years the University Women's Organization had as two of their four study topics, "The Human Use of Urban Space" and "This Beleaguered Earth—Can Man Survive?"

Our group with a membership over 165 women is located primarily in two northwest Chicago suburbs, Park Ridge and Des Plaines with some members from Mount Prospect and Arlington Heights. These suburbs are adjacent to O'Hare International Airport.

During the past 2 years the two study groups have focused on noise pollution and problems with special emphasis on air and highway sources.

For 18 months branch members have actively participated in the formation and activities of concerned citizens groups that are dealing with offensive noise levels. Increased noise levels have lead to the deterioration of the quality of life in these suburbs which in most instances have been organized communities for over 100 years.

Representatives of our organization have attended the meetings of the citizens group NOISE. Topic leaders have attended public hearings conducted by the Illinois Senate Subcommittee dealing with O'Hare Airport noise.

Some groups have set up monitoring devices near the airport that show noise to be at an objectionable and detrimental level.

Through individual study and investigation we have considered the problems of jet noise and the hazardous effects on man. Study group discussions and findings have been reported to the general membership.

Though we could not capture a sampling of the noise level we present example one which is a byproduct of the total jet destruction. This is an example of residue accumulated over a 21-day period on a newly painted table for patio dining in a home located 7 miles from O'Hare International Airport. This residue of jet fuel expulsion is a known hazard to man's environment. Though courts award homeowners property compensation there is no payment for excessive human body deterioration.

With new interest and increased awareness, individual members have felt a responsibility to express themselves by communicating with elected officials at local, state and national levels. An all-member letter writing campaign was encouraged, promoted and realized. It is out of our study and concern that we file these statements today.

We strongly urge that there be no further expansion of O'Hare International Airport.

An immediate decision must be made in choosing a site for a third airport. It is imperative that another airport be located in a less congested area though certainly not in Lake Michigan.

All projections indicate that by 1975 all air traffic, both passenger and cargo, will be doubled or even tripled. Presently O'Hare Airport with its high noise levels affects the lives of nearly a half million people in a 10 mile radius of its parking lot. Expansion must be stopped and the situation as it now exists must be rectified to prevent the further deterioration in the quality of life.

Legislation should require the manufacture of quieter jet engines. Ecological factors outweigh the increased cost of noise-suppressed engine production. Rapid ascent enforcement is essential. Demands should be made that pilots comply with ascent and descent regulations. Stricter FAA standards for noise abatement should be set for this airport.

In order to best utilize urban space we urge airport personnel and aircraft operators to comply with Federal air pollution standards.

The membership of the Northwest Suburban Illinois Branch of the American Association of University Women ask the Environmental Protection Agency to use its power in our governmental process to abate the noise level in airport environment which leads to extreme health complications. We thank you for this opportunity to make our views known.[1]

Dr. Meyer. Is Mr. Omar Marcus still here? Mr. Marcus is a writer. I am glad you could stay, Mr. Marcus.

STATEMENT OF OMAR MARCUS

Mr. Marcus. Mr. Chairman, members of the panel, it's my pleasure to present to you an article actually intended for publication, assigned by a chain of newspapers and planned for publication shortly.

If, in its presentation, some explanations on sound and sound measurements should appear irrelevant or rather preposterous to the experts on the panel, I would ask your forbearance, because this article is intended for the general public who know little or nothing about sound measurements, and its effects on their physical and mental health, but who only suffer, and would like to find a way to defend themselves.

In his much-heralded declaration of war on pollution and environmental destruction, Mr. Nixon made regrettably scarce mention of one of society's worst enemies: Noise, excessive noise; lamentably little mention of it was made by experts who addressed Northwestern University's mass meeting on pollution some time ago. Yet, it is an established fact that noise is physically harmful. To combat this invisible enemy is far less costly than the war on air and water pollution.

Sound and its measurement

It would be difficult to understand or attempt to alleviate any problem associated with noise without some comprehension of the complex character and characteristics of sound.

While this article is not intended as a scientific dissertation on sound and its terminology, suffice it to say that sound intensity is measured in decibels (dB).

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[1] This material for this testimony is on file at the Office of Noise Abatement and Control.

Briefly, a 1,000 cps (cycles per second) sound which can just barely be heard. This minimum sound is given a decibel level of zero. If the measured sound intensity is 10 times the reference level, it is rated at 10 dB.

Careful though. Decibels actually express a ratio between the intensity of two sounds, and the numerical value of the db increases logarithmically.

To illustrate: The rise from 0 to 10 dB represents a 10-fold increase in sound intensity. But a rise from 0 to 20 dB means the intensity has gone up to 100 times; and the decibel change from 0 to 30 represents an increase in sound energy of 1,000. By the time the decibel level reaches 100, the sound energy has gone up 10 billion times from the threshold of hearing.

Measurements of intensity and frequency apply only to the physical aspects of sound, without indication of human interpretation in terms of loudness.

Intensity can be measured by instruments; but loudness level, a subjective experience, can be determined only by the judgments of a number of people. Therefore, experimenters have established that the sensation of loudness varies not only with the intensity (dB), but with the frequency (c.p.s.) of a sound. So, sounds of the same intensity do not necessarily create sensations of the same loudness.

Consequently, loudness level is expressed by a physiological unit called the phon.

Noise is physically harmful and reduces productivity.

Europe's No. 1 noise buster, Prof. Gunther Lehmann differentiates between three grades of noise: Grade 1 has only psychological effects; grade 2 affects the vegetative nervous system directly, while grade 3 harms the auditory organ.

Grade 1 goes as high as 65 phons, the phon being the unit of noise. An external machine noise may become quite unpleasant with as low as 40 phons. Even weaker noises may, through psychological excitement, gradually produce vegetative disturbances—especially nocturnal noise.

The psychological degree of noise differs from one individual to another. According to Professor Lehmann, everything depends on a given person's individual sensitivity, which is not a fixed entity but varies with the person's emotional attitude toward the source of noise.

Noises we make ourselves, or those associated with a process we like, are seldom found unpleasant however high their phon figure. Young parents love the cries of their babies which infuriate their neighbors; dog owners are thrilled by the bark of their pets, and the teenage motorcyclist delights in the roar of his engine without muffler.

Indeed, a factory worker who is proud of a special machine and the work he does on it, may frown on any noise reducing measures ordered by the management.

For many the sense of strength and importance is somehow associated with the noise they can produce.

Sixty-five phons awake and 45 phons asleep are the limit beyond which vegetative reflexes in our nervous system will appear automatically, regardless of our like or dislike of noise.

Professor Lehmann found that the most important reflex is a narrowing of the arterioles, the smallest arterial blood vessels, particularly in the skin and in the mucous membranes.

The resistance within the vascular system is increased. This does not lead to any increase in blood pressure, but the amount of blood thrown out by the heart at every pulse is reduced, resulting in a reduction of the total circulation in the body. It may reach up to 50 percent of the time-unit volume of circulation.

The decrease in pulsations in capillaries—those minute vessels connecting an artery and vein—permits even a measurement of this dangerous phenomenon.

The effect is independent of the sound frequency; it is weaker in young persons than in older ones. This circulatory effect has a duration equal to that of the noise producing it, which may mean hours, and recedes slowly thereafter. It is entirely independent of the will. Nor is there any habituation.

Psychologically, we may become accustomed to some noise but our vessels never will.

An associate of Dr. Lehmann's made a conclusive study on steelworkers exposed to much noise at their jobs; a group of workers exposed to a weaker noise serving as a control. The group exposed to excessive noise showed circulatory disturbances in the skin and the mucous membrances, increased irregularities of cardiac activity, some increase in disturbances of digestion and equilibrium and a rise in the cholesterol level.

When excessive noise persists long enough, the vegetative trouble may become established and produce clinical symptoms.

A typological study of the workers involved showed that those on the noisy jobs were all sturdy, resistant men. A weaker person would never take a job with a high degree of noise. Yet, even stable, strong men are affected by noise. In fact, it was shown that those athletic types suffered more conflicts in family and factory than the men of the weak noise group did.

Noise produces nervousness even in strong men. Moreover, they are nearly deaf for some time after work, which presents another source of human conflict.

In the light of such findings, we may imagine the physical harm suffered by countless thousands of all age groups in dwellings adjacent to rail tracks, exposed, as they have been for years to that most harmful of sounds, the excessive intermittent ones, like elevated, long distance or mile-long freight trains, engine and factory whistles, and a host of associated noises, teenagers reveling in literally deafening rock-and-roll pounding, not to mention the bandsmen themselves.

Even in orchestral classical music, a percussion player goes progressively deaf to high frequencies.

A Japanese college student, preparing for an examination, became so enraged by a mechanical piledriver close by, that he rushed out and put his head between the pile and the crashing hammer.

All of which leads the writer to the strong conviction that there exists a definite link between noise and violence.

My personal recommendations to the Federal Crimes Commission would be to view and review their findings in the light of this somewhat startling theory. It would not be surprising if a large percentage of crimes, especially ghetto crimes in overpopulated areas, were to be traced back to perpetrators' exposure to excessive periods of excessive noise—a potential crime factor to be fought at its source first and taken into consideration before condemning a culprit for what he committed, at least partly due to traumatic conditions out of his control, which he may have suffered.

Therefore, a person committing an act of violence under the immediate impact of a noise assault ought to be considered as acting in self-defense instead of being jailed as an aggressor.

In this complex science of noise evaluation, we have to define the common concept of "well being."

A person's well being is also conditioned by his exposure to noise. In other words, "well being" for the scope of preventive medicine—according to the definition of the who—means "a state of optimal psychic, physical and social well being" and not only freedom from disease.

This guiding concept is of decisive importance for the entire war on noise from the point of prevention of health hazards.

Because of the problems of defining "sickening noise" as a disease without concretely provable factors which may have caused it, noise combatants created those three above mentioned categories: noise nuisance, health hazards through noise, and damage to health through noise.

Assurance of an adequate, undisturbed rest period in residential areas—especially at night without underrating the importance of antinoise measures at work—is one of the most important conditions in the war on noise.

Grownups need approximately 8 to 9 hours sleep, children and patients correspondingly more.

There are millions of people who, for 24 hours every day, are exposed to some kind of noise: at home, at work, and in traffic. In the deliberation of the most important noise reducing measures, an overriding importance should be given to assurance of an adequate recreative phase during sleeping periods, generally at night.

However, in view of sleeping periods being conditioned by individual professional requirements, public noise abatement measures ought to include police-protected rest periods of at least 9 to 11 hours in residential neighborhoods.

It should be noted that intermittent noises during one's sleep need not necessarily cause awakening, but will nevertheless impede one's sleep from being sufficiently recreative.

We metropolitans are slowly going deaf as a result of growing, yet unchecked daily and nightly noise around us.

The American Medical Association reports an increase of 100 percent every 10 years in the overall loudness of metropolitan noise. The American home, especially the modern kitchen, with over a dozen different kinds of laborsaving devices whining and grinding, exposes housewives and kitchen workers to harmful sound levels equal often to those of a steel mill.

Over 7 million of our population are exposed at work to deafness causing noise levels, the United States Public Health Service reports.

The Federal Republic of Western Germany appears to be the most progressive country in the fight against this invisible public enemy. Their Secretary of State for Residential Construction issued "Ten Commandments" to architects in form of a technical, well-illustrated booklet, equivalent to a building code for the suppression of noise.

"There is no more any excuse for inadequate sound protection," the minister's appeal to architects begins; soundproofing measures for new buildings must follow recommended lines before they're passed by the building authorities using complicated electronic sound testing equipment.

In Japan, instrument equipped sound patrols may close an establishment or bar exposing the public to harmful noise.

What can we do—that means every one of us—to halt and reduce this ever-growing menace of harmful noise?

Clearly, everyone must do his share, for there will never be enough patrolmen to enforce sound regulations. Most of the domestic noise nuisance is due to selfish lack of consideration for the rights of others.

If a youngster wants to attend early Mass on a Sunday and, in the process of getting up and ready, awakens neighbors above and below, he should think again about the purpose of going to church—or tell the father confessor: "In order to get to Mass on time, I robbed my neighbors of their much deserved Sunday sleep, slammed bathroom and kitchen doors, stampeded about the house in heavy boots and revved up my car engine to make it warm up faster."

If you live close to the "L" tracks and are unable to move away, it wouldn't be practical to request the almost bankrupt CTA to replace its antiquated rolling stock with modern, sound controlled equipment. But have you ever tried using ear plugs?

Some synthetic material—as used by jet aviation workers—fits snugly into ear ducts and will yield a high frequency noise reduction of about 35 phons, equal to over 50 percent.

The writer has been inseparable from them for years. For the subway they're recommended as a regular practice; you'll have the aural sensation of riding on a Pullman sleeper—except in screeching curves.

Antiquated complaint procedures: Many existing abuses are due largely to apathy on the part of sufferers, their fear or unwillingness to voice their complaints vigorously, and last but not least, to clumsy, time-consuming methods of bringing a legitimate complaint before a magistrate; not to mention reprisals any such person might expose himself to, for being the only one courageous enough to sign a complaint.

Countless legitimate complaints pouring into police stations day by day are caused by devices designed to save domestic labor. If you feel you really need a sputtering motor on your lawnmower to give you a sense of power, please remember, too, that a multitude of motorized lawnmowers in operation may turn a respectable residential neighborhood into an inferno. Remember too, that like yourself, your neighbors have a right to live in peace and unpolluted air. After all, a muscle-powered lawnmower is excellent for waistline control.

Since the beginning of coal delivery by truck to private dwellings and apartment buildings, it was carried or shoveled into the boiler room—until someone invented a motorized mobile conveyor belt capable of terrorizing a wide area for hours at any time from early morning on, with a noise way in excess of the tolerable level, at times accompanied by the whining processing device of half a dozen garbage trucks which, too, are still permitted to operate anywhere at any time; not to mention teenage gangs of no-muffler motorcyclists keeping neighbors alarmed around midnight.

Don't despair. Don't let inconsiderate neighbors' dogs, motorbikes, horn-blowing boyfriend dates, destroy your peace. Don't let coal merchants or garbage collectors enrich themselves at the expense of your physical and mental health. Call a police patrol car. And if the nuisance persists, talk to the police station commander or call your councilman. They're there to help and they usually do.

They will listen to you when you explain that your health is being attacked, undermined and gradually destroyed by unscrupulous noisemakers.

They also have ways of making offenders conscious of both the limit of their civic rights and the start of their obligations. The more complaints they receive, the sooner we're likely to get noise legislation.

Alas, the police, too, might exercise more restraint in the use of whistles. They're intended for emergency use only—not for directing traffic. This ought to be done with flashlight-equipped sticks. As for patrol car sirens in the quiet of night, they're loud enough to wake the dead.

While it is impossible, within the scope of this article, to mention more than just a few of the most common sources of noise nuisance, there is one which merits attention because of its insidious design.

At the end of each news bulletin Radio Station NBC, in a show of adolescent sensationalism, transmits a siren like crescendo pitch sharply rising to ultrasonic, ear-splitting frequency. Don't listen to it. It's harmful. For every trick used by a radio station to capture your attention, for every half-ass disk jockey who disturbs your listening or viewing pleasure, there are at least two others to choose from who won't—in a metropolis like Chicago.

With due credit to the meritorious efforts of crusaders against air pollution and environmental destruction, are we not putting the cart before the horse by treating noise abatement as a stepchild?

If we permit harmful noises to stay at their present level, that is letting them get worse, our physical health, our hearing and our minds will become affected to such a degree that we'll be unable to fight air and water pollution and enjoy the fruits of our efforts, when the battle is won.

If we don't stop excessive noise now, future anthropologists will liken us to biblical idols: "They have ears but hear not."

What we urgently need right now is more complete enforcement of existing police regulations regarding noise. This would be often sufficient, if they were really made use of.

But what is needed above all for a successful war on noise is a detailed program of legislative and administrative measures, culminating in the appointment of a Noise Commissioner in every large community.

This program would doubtless obliterate noise everywhere; though we may expect that those who might feel inconvenienced, financially or otherwise, by the abatement of noise will oppose it to the limit everywhere.

Dr. **Meyer**. Thank you, Mr. Marcus, for a very scholarly review of the knowledge and views of your own with regard to the noise problem. Thank you very much, sir.

Mr. **Marcus**. May I make one more brief comment, please?

Dr. **Meyer**. If you will make it rather brief, sir.

Mr. **Marcus**. Yes; I will. I would like [illegible]comment on personal experience I have had in reporting noise to [illegible]e rank and file of policemen who have been showing what I migh[illegible]all an obstructive indifference to noise nuisance. I would like to recommend that attention be given to the instruction of police officers on their duties to the public by which they are paid.

I would also recommend that garbage trucks, or rather their grinding mechanisms as in use right now should be condemned and banned until the manufacturers are instructed to abide by sound regulations enforced by the EPA.

Furthermore I would like to recommend that attention be given to a type of motorbike that has made its appearance in recent months, or years, perhaps, called choppers, commonly called choppers. They are motor bikes used by hippie-type owners with arrogance and you may associate this type of motorbike with an abuse of noise regulations, and I think a crackdown is more than overdue.

I should also mention one particular location which I observed, although much has been said about the noise created b[illegible] elevated trains, there is one at the border of the city limits of Chicago where the trains make a curve, and each train on—in dry weather makes a screeching, ear-busting noise which at times can be heard for over a mile away.

I live on the lake shore, and last night I heard the screech at 1:30 in the morning, screeching noise of this train, and I feel something ought to be done. The CTA is no exception. Furthermore, to end on a positive note, I have, myself, made a contribution toward this in documenting graphically yesterday morning the operations of a noise inspector of the city of Chicago who, at my request, appeared on the scene of a garbage truck collector who the police said failed to bring under control for over 2 years, and yet the control—the inspector appeared with his noise measurement instruments and finding excessive, excessive noise, fined the driver and summoned him to court. This picture (indicating) has been circulated with one of the wire services, and I hope it will do some good to the common cause. Thank you very much, sir.

Dr. **Meyer**. Thank you, sir.

Dr. **Meyer**. Is Mr. Richard Blomberg of the O'Hare Noise Abatement Council here?

Mr. **Blomberg**. Mr. Chairman, would you, instead, recognize Mr. Ted Decca? I understand he has a 7:30 meeting to attend.

Dr. **Meyer**. Are you Mr. Blomberg?

Mr. **Blomberg**. Yes, sir.

Dr. **Meyer**. Are you yielding?

Professor **Plager**. May I make one observation to Mr. Marcus, before he leaves, for his future articles, and that is I understand him to say that the mind may adapt, but the body won't, to noise. I would simply observe that perhaps the solution, Mr. Marcus, is evolutionary change over time to where our bodies, in fact, do not hear anymore. Just a thought.

STATEMENT OF TED DECCA, O'HARE AREA NOISE ABATEMENT COUNCIL

Mr. **DECCA**. Gentlemen, I would like to be very brief, if I may; it has been a long day, I am sure, for you. Let me first express my personal thanks for your interest and infinite patience in listening to all this testimony. May I make two quick corrections to your schedule of witnesses.

First, my major reason for being here is my involvement in the O'Hare Noise Abatement Council as vice chairman and director for the last 3 years. Secondarily, I am an alderman of the city of Wood Dale, possibly because of my ability to timing my speeches around the aircraft noise, while my losing opponents were not aware of this.

What I am about to convey to you are the feelings of the citizens of the suburbs around the airport. May I also state at this time, with the exception of Elk Grove Village, those communities were incorporated before Orchard Field was built.

Now, Orchard Field is the predecessor of Douglas Field, which is the predecessor of O'Hare Field, although my information relates to O'Hare Field, the same problem exists at most, if not all, throughout the country.

As you look at the information I have handed to you, you will find some representative samples of letters of complaints. The letter addressed to you, Dr. Meyer, sums up the feelings of everyone. I didn't pilfer your mailbox. I got a copy of it indirectly. Let me quote from just a part of it:

> People work hard to provide for their family. My husband works 10, 12 hours a day, 6 days a week. Like most people he battles traffic congestion, et cetera. He comes home to relax and pow, airplanes every few minutes going over the house.

I will leave the rest of this for your information, and will not go into it.

Dr. **MEYER**. The appropriate items will go with our records.[*]

Mr. **DECCA**. Thank you, sir. One of the aspects of the noise problem that is overlooked is that related to the schools and the students.

Now, I have given you, as well, two letters from the surrounding community schools, that being the board of education from district 2, from Bensenville, and the board of education from district 100 of Bensenville, and Wood Dale District 7, grammar school district of Wood Dale.

Now, very quickly I will read a few items for your information. This is a letter from the Superintendent of District 2 and 100:

> My conservative calculation of the 22 interruptions or delay in instruction caused by aircraft noise cheats the young students in the community of Bensenville of approximately 2.3 teaching hours in a day.
>
> The environment at Lincoln Elementary School for the handicapped children has become so intolerable that the board of education is currently in the process of selling the building and site and relocating the students in a building further away from O'Hare Field.

May I wish him luck in that regard. Some of my neighbors haven't been so lucky to sell their homes.

Dr. Warren Carson, the superintendent of district 7 school in Wood Dale:

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[*] This material is on file at the Office of Noise Abatement and Control.

> Two schools in particular, Highland Elementary, built in 1921, and the Wood Dale Junior High built in 1966 are the major recipients of jet aircraft noise. Yet the effect of this noise is that for every aircraft landing or taking off during school hours, we lose a minimum of 20 seconds instructional time. The unfortunate part about this is it is immeasurable, the amount of concentration time lost for the students, and I, myself, have three children in grammar school and am very concerned about the problems they have to face in the world today, and the fact that they are being cheated of an education by an organization of profitmaking people.

I will leave the rest of the Fenton student report for your reading pleasure.

Included in this informational package are some sound level readings which bear witness to the magnitude of the problem.

One of the items that the FAA points out is the existence of noise abatement procedures at O'Hare Field. These procedures went into effect on April 20, 1970. The runway reminder signs were put up in August 1970. Upon reviewing these procedures, this first statement of the procedures gives you an in-depth idea of what the rest of them are about:

> The following noise abatement procedures have been promulgated by a joint FAA-industry committee to serve as a guide to aircraft operators, pilots, and air traffic controllers in achieving a greater degree of noise abatement, and do not supersede, amend or nullify the applicable FAR's company operating rules, air traffic rules and procedures, or good operating practices, which means they are virtually useless.

I might also comment very briefly and say they are not being enforced, they are not being followed.

The question was put to the FAA, and in particular Mr. Neal Calahan to the effect of asking, number one, has anyone ever been punished for violating these rules.

On two separate occasions the FAA responded no. This indicates either all pilots are perfect—and, to my knowledge the last perfect human being was crucified—or the only other deduction that can be arrived at is that the regulations are not being enforced.

A proposed rulemaking committee was instigated by the FAA. We submitted our comments and suggestions related to this, and to date have received absolutely no reply.

The letter, which you have a copy of, sir, was, if I can find it in the pile here, was dated back in January.

Dr. **Meyer**. January the 26th, I believe.

Mr. **Decca**. That is correct. Thank you. The point of the matter is that as Mr. Franks has said, and many other people have said today, is we have gotten absolutely nowhere.

One other comment that is of value in my behalf is as a general statement, all documentation I have seen relating to noise exposure levels in areas surrounding the major airports relates only to direct line noise on straight arrivals and departures. It is not at all realistic to believe that aircraft will not change course until reaching cruising altitude.

As a matter of fact, I have proof, if anybody is willing to look at it, willing to come to O'Hare Field and watch them make a 90-degree turn before they depart from the physical limits of the airport, they are going due south.

Let me summarize by saying that the jet noise pollution problem is disrupting to the life of many millions of people as well as the educational opportunities of our younger generation.

We must look to another airport to service the anticipated increase in traffic. We, as the O'Hare Area Noise Abatement Council cannot tell you where, but we must encourage you to consider the errors committed at O'Hare Field.

Please do not force other residents who can now enjoy their homes in surrounding lands to suffer as we now do.

Immediate relief is one of the requirements we ask now. They can only be experienced by the establishment of workable enforced noise standards. These standards must take into consideration the fact that people do live 24 hours a day. Thank you, gentlemen.

Dr. MEYER. Thank you very much.

Professor PLAGER. One quick comment, Mr. Decca. I think you heard earlier the statement from Mr. Desmond about the Illinois task force.

Mr. DECCA. Yes.

Professor PLAGER. I would think they would be quite interested in this material. I wonder if you would be willing to make a copy of that submission available to them.

Mr. DECCA. By all means, sir. I will be glad to give them a copy that I have here, if Mr. Desmond will meet me by the aisle.

Dr. MEYER. Very good. Thank you for taking the time to assemble this data, because it is very valuable to us.

Mr. HINTON. Mr. Chairman, may I ask Mr. Decca one question?

Dr. MEYER. Yes.

Mr HINTON. You said that your procedures—those procedures, is that enclosed?

Mr. DECCA. No, sir. I do not have more than one copy of it. I would be more than happy to mail a copy to the group here.

Mr. HINTON. Will you do that.

Mr. DECCA. I will.

Dr. MEYER. If you will get it to me——

Mr. DECCA. Yes, I will do that.

Dr. MEYER. Thank you very much for taking the time to do this.

Dr. MEYER. Mr. Blomberg, you yielded kindly, recognizing our time constraints, so would you come forward now? We will be happy to hear from you, sir.

Mr. BLOMBERG. Thank you, Dr. Meyer.

STATEMENT OF RICHARD BLOMBERG, O'HARE AREA NOISE ABATEMENT COUNCIL

Mr. BLOMBERG. I am also a director and vice president of the O'Hare Area Noise Abatement Council. I think while the previous testimony is pretty much related to the problems, I think it's another thing to look at the responsibility, and what people who were in a responsible position had done.

Public Law 90–411, or 411, I should say, was passed on July 21, 1968, and the opening sentence of that law reads:

> In order to afford present and future relief and protection to the public from unnecessary aircraft noise and sonic boom, the Administrator of the Federal Aviation Administration, after consultation with the Secretary of Transportation, shall prescribe and amend the standards for the measurement of aircraft noise and sonic boom, and shall prescribe and amend such rules and regulations as he may find necessary to provide for the control and abatement of aircraft noise and sonic boom * * *

and it goes on—but the FAA did have the authority.

On the 12th of November 1969, the FAA in Washington did release noise certification standards for new aircraft, and in there they stated that today's largest aircraft are operating at 110 to 120 effective noise decibels.

This is not the scale that is usually found on sound meters. It's a special scale, and it's for aircraft noise, and the statement made with relation to the new level was that this would be lowered to 102 to 108 effective noise decibels. They went on to state the 102 to 108 effective noise decibel range is similar to noise experienced by the operator of a four-cycle powermower.

Now, I have an article which has been submitted in evidence that says that the average noise level of a powermower measured on the C-scale was found to be 97 decibels. It also goes on to state that the SAE committee on noise levels has suggested a maximum limit of 72 dBA for normal operation.

They indicate that the powermower is too noisy, and the FAA is telling us we have something to look forward to, they are going to lower the level of the present powermower.

On July, in July 1970, the final report by the Rohr Corp. was issued, a report prepared for the Department of Transportation Office of Noise Abatement, and one conclusion in that report was this, it said that alternatively a small fare increase is necessary to completely offset the cost of a retrofit program. And, of course, George Franks has indicated our support of Senator Cranston's bill.

On November 4, 1970, in the Federal Register, volume 35, No. 215, the FAA, through the Department of Transportation issued an advance notice of proposed rule making, civilian airplane noise reduction retrofit requirements, but even though the FAA was aware of our existence—very much aware of it—we had to learn of this particular proposal in a letter from Inglewood, Calif., from the city of Inglewood's mayor, Bill Goedike; in a letter to George Franks on December 8, 1970, he informed us of this and sent us a copy of this particular measure.

In turn various members, including myself, of the council were in touch with such groups as Airline Pilots Association, and were very much amazed to find out that they had no knowledge of this proposal, even though it directly affected them.

Furthermore, with relation to the 727 aircraft, which has a weight of approximately 152,000 pounds, the FAA certified a 727 stretch jet, which added 20,000 pounds to that aircraft, and allowed it to carry more cargo, but it was certified with the same engine—and I don't think it takes anybody technical to realize if you have a heavier aircraft and put more cargo, and you use the same engine, you are going to have more noise, and at an FAA meeting, in an attempt to support anything that they might be willing to do, we asked them could we possibly, since we do represent a number of citizens, would it be possible for us to help them, by money for equipment at O'Hare, if they did not have the best equipment?

The statement was made that they had the best equipment available, and we found this particularly interesting shortly thereafter because we found out that Atlanta and Kennedy have radar equipment which will tell them the height of the aircraft, and O'Hare does not.

And they also, of course, have no sound monitoring equipment at O'Hare, and yet in Oslo, Norway, sometime prior to the issue of this article in 1965, they had aircraft noise measurement and evaluation.

Prior to January 11, 1965, Frankfort's airport, which is the busiest in Germany, also had jet noise monitoring systems. The statement made in the article was monitoring systems have been in service since 1963 in various cities, including New York, but there is no system in the United States similar to the Frankfort network, according to the Federal Aviation Agency, and the Port of New York Authority, and to this day at O'Hare, the busiest in the world, we still do not have any monitoring equipment. I think that speaks for the FAA.

Now, the other question that has been brought up is what about the owner of the airport, possibly they have something. In the U.S. Senate Report 1353, the 90th Congress, the Second Session, which accompanied the House bill 3400 on aircraft noise abatement, the statement was made that the Federal Government is in no position to require an airport to accept service by larger aircraft, and for that purpose, to obtain longer runways; likewise, the Federal Government is in no position to require an airport to accept service by noisier aircraft, and for that purpose, to obtain additional noise easements.

The issue is the service desired by the airport owner, and the steps he is willing to take to obtain the service, and yet when the city of Chicago, represented by J. P. Dunn, O'Hare field manager, spoke before an Illinois Senate subcommittee he said, "Our job begins and ends at the fence. We are just the housekeepers."

It might be an interesting thing if maybe the owner of a factory in Chicago, with dirty smoke pouring out of its stack said afterwards, "Well, it's out of my control." Maybe there is a parallel there. I am not quite sure.

Now, recently I have come into being of a copy of a letter that was dated June 8 with relation to a new runway that is being put in. A hearing was held in Chicago on this. It was a couple of lines in one newspaper that is published in Chicago, and the runway is 4R, 22L, and in line with this runway are the national freight yards of the Milwaukee, St. Paul Railroad. In fact, this runway goes right over the middle of them, and the attorney for the Milwaukee road has estimated that it will cost the Milwaukee road something like $1 million to convert this freight yard so that the airport runway is usable, and while the letter was sent from the Department of Public Works, city of Chicago, saying they were aware of that problem, the runway is still going on, being built—as usual, just as the one did in 1967 that flies over the northern section of Schiller Park in the residential area. People bought 2 years prior to the building of that runway, they built their homes there; it's 2.2 miles from the start of roll and approximately three-quarters of a mile from the end of that runway, and the reason I brought up the matter of these two items, and the people from Schiller Park, in that area were not able to come here during the day, and with relation to the Milwaukee, St. Paul Railroad, the gentlemen that you have listed down there, the Brotherhood of Railway Signalmen, had to leave because they had a meeting in their area at 7 o'clock. It was unfortunate they had to leave.

Interestingly enough, a local newspaper had a picture of that runway, no article, just a picture saying, "Relocation of Highway," which was from public funds for the benefit of that particular runway. That's all there was. As far as the people, there was no notice. All they saw was the construction of the runway.

Now, yesterday you had the Air Transport Association here, Mr. Becker. Mr. Becker testified at the third meeting of the Illinois Pollution Control Board on airport noise. When finally he ran out of talk—my words, not his—he said that inasmuch as he was representing the airlines, that they just don't know what they were going to do about the problem. We have an answer. We have an answer. We have Mr. Cranston's bill, which he doesn't seem to like .

In the hearing yesterday I understand Mr. Becker made a statement, something to the effect that a third of the population is made up of hard core complainers. Well, if we are in that number, a third of the population, we are not going to be satisfied with the view that Mr. Becker has.

Now, an editorial in a local paper stated the air transport industry's biggest concern is rapid expansion, not the well-being of airport neighbors who may not even be customers. This—was this really the fact or not? Well, you have to think, look at the record. Number one, one of the statements made with regard to retrofit of jet engines is that the aircraft are old, and pretty soon, of course, they will be obsolete, and be replaced by new aircraft which will be much quieter.

I would like to ask Mr. Becker, then, why Pan American Airways is spending $300,000 per plane on new wing assemblies for their 707's if that is the case; they are getting old—apparently they are not quite that old, and the question that came up at the Illinois Pollution Control Board on the, an example of cooperation, it is a fact that the airlines were willing to retrofit their engines so that they would have a clean burning engine, and the deadline that they proposed was 1980. When the Federal Government leaned on them they came down to 1976, and when other people, particularly the Illinois attorney general said, "You may fly your aircraft because I can't stop you, but I am going to fine you as air pollutors," all of a sudden the deadline came down to 1972—a difference of 8 years, and therefore I would question whether the airline industry has the people first in mind. I would rather doubt it, on the basis of past experience.

In the May issue of "Air Progress' it stated the following, for the record:

> The Secretary of Transportation, John A. Volpe predicts a 300 percent commercial passenger increase by 1980, and a 400-percent increase by 1985. However, Volpe warned the public will not stand for further noise environmental pollution. Anyone who thinks we can meet that kind of demand with today's organizational resources, with today's pollution congestion, with today's intolerable noise levels just doesn't know how mad people can get.

I think maybe we are finally getting through.

Now, as for the record, our organization, in a letter to the FAA —one that Mr. Decca referred to on January 26, 1971, we supported the Cranston bill indirectly. We weren't aware of the bill itself. We were aware of the Rohr Corp. report, and we called for repayment of Federal loans which would come from airline ticket tax.

In my letter to the FAA, since we have differences, we are democratic in our organization, and I wrote to the FAA, and in that particular letter that I wrote I pointed out about the noise levels; one example of this problem is Runway 9R at O'Hare International Airport, which was built in 1967, several years after the single family residential section of Fairview Heights in Schiller Park, Ill., where the residential area is only 2.2 land miles from the start of roll; on the extended Runway 9R center line the only apparent practical answer is to change the land usage to industrial. The alternative is to stop the use of Runway 9R for departures and Runway 27L for arrivals.

Of course, lately there has been much concern in the paper about destroying houses. How often several people in Schiller Park, in that area, have told me if someone will give them the market price for their house—not what it's worth on the market now, but what it should be worth, and they will give them the interest rate they have on that house—which I think is only fair—one gentleman in particular stated, "I will move out tomorrow."

In fact, this same gentleman has a portable camper trailer in his garage, and I said, "I see you must enjoy camping."

He said, "No, I really don't."

I said, "Well, why the trailer?"

And his comment was this, "I go out every other weekend in that trailer because I prefer the insects to the noise from the aircraft."

In a letter authorized by this council, now State chartered on June 21, 1971, this council went on record as supporting Senator Cranston's bill, Senate bill 1566, and a companion bill introduced by Congressman Wilson in California, which is House of Representatives bill 7523, we support these strongly.

As you gather from my testimony, we are not satisfied that the people who run the airport and the people who run the operations at the airport have done all they can. We feel they could have done more; however, they all have responsibility—the FAA by stating that the pilot as the captain of his plane, for example, and then when you call the runway or call the tower up and ask why an airplane is going directly north over Mannheim Road, when the corner of the airport, the southeast corner is at Mannheim and Irving, you get an answer well, he was vectored to that particular course, which means he was directed to go over that course.

He may be the pilot of his ship, but it's the FAA that is telling him where to go, and for that reason our council has taken the stand that neither the FAA nor the city of Chicago, nor the airlines are going to voluntarily retrofit their aircraft, or voluntarily going to bring noise relief to the citizens, and therefore this council, in unanimous vote, has asked that this Federal Environmental—I am sorry, it's getting to me, finally—the Environmental Protection Agency, you, Dr. Meyer, take charge of this, that you oversee the retrofit of the jet engines, providing that Senator Cranston's bill is passed, and that you oversee the operation of O'Hare Airport because we have suggested prior to this at the meeting with the congressmen, for example, that there be a noise abatement officer at that airport to utilize sound devices to determine if there are violations, unnecessary violations in the field of noise, and we ask that your Agency, sir, take on that job, because obviously the FAA is unwilling to do so.

Dr. **Meyer**. Thank you very much for your review of the material additional to what other representatives of your organization have presented. This supplements their presentation.

Before I comment on your last recommendation, panel? Well, let me first make a comment. Since you support the Cranston bill, you obviously, then, are not against air transportation per se. Is that a fair statement?

Mr. **Blomberg**. We have no intention of closing the airport, but we are aware, as we have learned firsthand from the pilots who fly aircraft out of that airport, that the peak efficiency has since been passed, and they feel that if they feel that way, obviously we would have to agree with them that there is even a safety hazard to the number of aircraft being put into the air; as an example of this, the limit of aircraft operations at that airport is currently 135 on a temporary basis, and yet the FAA readily admits that it exceeds this, and thinks nothing about it.

Dr. **Meyer**. Well, you have answered my question; you recognize that there is a public need and a public utility involved here. I just wanted to be sure that you are not just antiairplane per se, and I think it's useful to know what colors your views.

In other words, you are taking a constructive approach. You think something needs doing, it needs bettering, it needs improving; the public health and welfare must be protected, which, as you have shown here, as others, is a problem.

Let me ask you a question. My colleague, Lloyd Hinton, has had to go, but I know he has been interested in this activity of the noise council approach which was discussed earlier today. The idea of representatives of the municipal, dual constituted municipal activities, the mayors, the elected officials, or whatever the group is, or the councilmen, depending on how each is organized, I think, what is it, some 23 political jurisdictions around O'Hare?

Mr. **Blomberg**. Actually we state 31, and we are recognized in 21 communities which have a promise that it is going to expand shortly.

Dr. **Meyer**. But—

Mr. **Blomberg**. Twenty-one communities by resolution have appointed a member from their village board to represent them at the council, on the general council.

Dr. **Meyer**. Fine, so whatever it is, if there could be some arrangement in the interim to do what apparently has happened in Minneapolis, where the council really works with the people who operate the airport, and their representation is there, and as you recommend, an airport noise abatement officer who represents the council and the airport authority to really work together. Do you think this might provide for a feeling that there is some action being taken rather than the picture I get out of all of this, that you have a monolithic organization standing off to one side saying, "Go away, don't bother us," and a group of people saying, "But we have got to bother you because you are bothering us."

Mr. **Blomberg**. Yes, sir. I think there is a feeling of total frustration. I think, if I can give a very short example of this, one member of our council who lives in Fairview Heights, who is a citizen member, and one occasion recently we passed material to him to be forwarded to his village in respect to getting any resolution from that village supporting the Alan Cranston bill, which a number of cities and villages and townships have already done, after contacting him our contacting village officials, I found no information had been relayed to them, and in calling this gentleman he stated that, "What is the use," he said, "we have gone there many times before and they will pass resolutions for us and everything else, but they don't do anything about the noise, and that is what really counts."

Dr. **MEYER.** Well, I guess I will really sort of point the finger directly at you. People are quite used to pointblank confronting me with how I feel about things, so I guess I am going to turn around and pointblank confront you about how you feel about your council, instead of writing letters to the various municipalities, really stepping forward to the city of Chicago, and whoever runs that airport and say, "Look, we are ready to get together and organize this joint sort of council based on the one that has been used four or five different places. Can we do it? Let's see if you will do it." Have you tried that yet?

Mr. **BLOMBERG.** I believe I have not. I believe other members of the council——

Dr. **MEYER.** No, I mean has the council voted to do this, in going back to their various municipalities and taken the leadership and saying instead of continuing this impasse we are willing to really try to come in and work with you for the time being, to try to get towards this area of solving this very touchy administrative, legal, and political problem. I am just saying why don't you do that?

Mr. **BLOMBERG.** Let me put it this way, the FAA does have the authority to do something about planes that are in the air which are the ones that bother us. We have attempted to approach the FAA, and have gotten nowhere, and the city of Chicago disowns responsibility and says it isn't theirs, even though somebody says differently, they claim it isn't their responsibility. I don't know who is putting down the runways, but somebody sure is out there.

Dr. **MEYER.** My proposal is why don't you try to get together by using some other political leaders. I am not a politician. Try to reason together and work this thing out. It should begin to have a better means of communication through some sort of formalized arrangements, when you all are proposing them. Then you have really exposed whether or not people want to cooperate, instead of everybody standing on their prerogatives. Just like that slide we saw yesterday, the man with the transportation company, two policemen arguing—if you were here, you saw the slide, it was a sports car, one saying, "No, it's not noisy," the other one saying, "Yes, it is," and the driver is driving away merrily.

I sympathize with you, and we are interested, and we are going to try to do something about it, we really are, we are going to accept our responsibility in writing this report to Congress and outlining these problems. We are accepting some responsibilities that are inherent in some of your review of what the other agencies do, and if we get this legislation that is pending, we are going to push ahead with it and try to solve the problem. But some of this clearly has got to be worked out at the State and local levels, and it would seem to me that with the tremendous effort that you all have done organizationally, and the magnificent work that you are doing, as evidenced in the testimony here, that perhaps there is a chance of now coming forward and saying, "Look, let's try to organize and discuss some of these problems." Some councils that have been started around the country are apparently beginning to work successfully. I am just offering this as a suggestion.

Mr. **BLOMBERG.** We would be glad to work with anyone, sir. However, we have found that by being nonpolitical has been the strength of our organization, since both parties are represented in the suburbs, and this has been the success of the organization for that reason. Other groups have failed because of politics.

Now, regarding the city of Chicago, we have supported bills recently, House bills 219 and 220 which were drawn up by a representative of the city of Chicago. In fact, I was in direct line of communication with him, suggesting amendments where it could be improved, where there was, because they were using an A-scale instead of a D-scale, where they could run into problems where they would pass noisier planes actually, and call other planes in violation that weren't as noisy, and the result of that bill was that when it came through the Senate, as similar bills have done, that it was killed, and it was killed from the city of Chicago.

I think that answers it. We just have had the door slammed in our faces. We are willing to talk to anyone, and even recently we sent letters out to airlines themselves saying, "We will talk to you, you name the place and we will be there."

But I realize that we still feel we will talk with anyone regardless, even if their viewpoint is different, we hope we can both learn from it, but unfortunately there are other groups apparently representing the airlines, and so forth. We will find out about them, but the city of Chicago and the FAA, I apparently don't feel that way, that is why we have to come to you.

We really have no other place to turn to about this. We cannot pass laws through our State legislature because, as you are well aware of, the city of Chicago has dominance in there, and also, of course, as was pointed out before, a legislator that lives downstate doesn't have much interest in aircraft noise abatement.

Professor **PLAGER**. Can I join in this just for a moment?

Dr. **MEYER**. Of course, Professor Plager.

Professor **PLAGER**. Mr. Blomberg, as part of the problem—I think what the chairman is suggesting is that, is a most sound and rational approach. I wonder if part of the problem is that you can't find anybody to sit down with who will accept the responsibility, or admit that he has the authority to actually come to grips with the problem.

Mr. **BLOMBERG**. Yes, sir.

Professor **PLAGER**. Is that part of the difficulty?

Mr. **BLOMBERG**. It is.

Professor **PLAGER**. Everybody says it's somebody else.

Mr. **BLOMBERG**. It is, indeed.

Dr. **MEYER**. The finger-pointing business.

Mr. **BLOMBERG**. Yes. It does, you go around the bush and you end up right back where you started from, no better off, no worse.

Professor **PLAGER**. That leaves you with a sense of frustration.

Mr. **BLOMBERG**. It does.

Dr. **MEYER**. Thank you very much, sir. We appreciate getting all of this.

Mr. **BLOMBERG**. Incidentally, I will submit some of this information. I don't have it ready today, but I will submit it.

Dr. **MEYER**. The record stays open for the next 10 days in case anybody wants to submit anything after having heard this. Mr. Tom Hamilton of the planning commission and zoning board of Elk Grove. I know it has been long for you, sir.

Mr. **EDWARDS**. The gentleman over here stole my byline, that the mind can absorb no more than the body seat can endure.

This is the first time in a long time that I rushed a half a block from my office to get here at 1 o'clock so I wouldn't miss the schedule.

Dr. MEYER. Well, we apologize for the fact that unavoidable circumstances sometimes preclude sticking with the schedule. We don't like to do this. We certainly do apologize.

Mr. EDWARDS. I understand it completely, especially since I am a substitute in taking the place of Mr. Tom Hamilton, of the Elk Grove Planning and Zoning Commission. He was unable to attend.

STATEMENT OF WARREN EDWARDS, ELK GROVE AVIATION COMMITTEE

Mr. EDWARRDS. My name is Warren Edwards, a resident of Elk Grove Village, and member of the Elk Grove Aviation Committee. In Elk Grove 10 years ago our Elk Grove Aviation Committee was formed with the purpose of informing the villages of any information we could gain about O'Hare Field and the planes flying there, and to help plan for the future, the right of the citizens and their property.

We appreciate the value of O'Hare Airport as a neighbor. Elk Grove boasts of having one of the largest industrial parks in the world, and both industry and residents benefit by its existence in its present form. We don't advocate closing the field. However, there is much that can be done to make us better neighbors, such as noise abatement procedures, such as Federal commercial noise standards acceptable to the area residents.

Federal noise abatement flight procedures and the method—and I underline this—of enforcing these procedures—I like to call it that we have to have a good policeman out there. We have got scads of rules and regulations, but as you have heard in previous testimony, I and many, many people that know a little bit about flying know they aren't being followed.

In 1967 Elk Grove adopted a master plan. This plan incorporated reflection of aviation, residential and industrial growth. It was based on information garnered from other governmental agencies which might affect us, such as roads and highways, recreation, population studies, and the city of Chicago.

Information from Chicago was based on a master plan of O'Hare Field dated 1964, which clearly forecast double runways in three directions at the field.

Now, this plan, I speak about the Elk Grove master plan, allowed for buffer zones, air corridors, flight paths over tollways, forest preserve and industries. Future zoning was passed on the basis of this master plan. In other words, we have done everything that every agency has recommended that a planned community should do to protect the interests of the residents, industry, give the airlines places to fly and fit right into a competent master plan.

We spent $30,000 of both Federal and local taxpayers money for this plan. Now, we find the O'Hare plan changed to have triple runways in three directions, and in our opinion the third airport is being built right now on top of O'Hare Field. To me there is no question of that. This makes all our planning for naught, and we have to discard or disregard our plan. We can't allow this mass of expansion of both the field and noise to drive our people away. We value our community. We have done the kind of planning as recommended by NIPC and others and still find ourselves in a vulnerable position.

There are methods of protecting our people, such as Federal legislation on the truth in airport expansion act. We got it in the credit field, why can't we have it here?

Dr. **Meyer**. Very good.

Mr. **Edwards**. A truth in airport area real estate act. Commercial developers informing potential customers or buyers where they are.

A truth in assessed valuation act. This would have to do with homes in a noise impact area. Sometimes you can find a little physical relief if somebody is given a little financial relief. This seems to be human nature. I hope I have added to the general fund of knowledge, and appreciate the time you have given us. Thank you.

Dr. **Meyer**. Well, one of the significant things that you have just said is one that I certainly can carry forward into the hearing in Dallas on urban planning. And that is the need for meshing up all of these different planning activities.

The Federal Government is assisting with financial grant planning through HUD, planning through a variety of other agencies; we have all sorts of "master plans" and I know in my own home town of Shreveport, La., we have had at least five different approaches to what the downtown and the region and so on ought to look like in the year 2000, or in the year 1980. And I think your point is well made.

People—I am talking about the taxpayer who spends that money, no question about it—invest public funds in a planning activity, and because of a lack of coordination in planning we wind up wasting them. It seems to me to be a rather disastrous situation, and I think the record and audience ought to know that the President's 1971 environmental legislative package does carry with it, in addition to the noise control bill, a regional land use planning bill in which some of the problems that you have just mentioned will be solved if this legislation is enacted in this session of Congress. It will require that all of these considerations of noise, airport planning, water pollution, highway planning and so on to be approached in a comprehensive regional manner, and still recognize, as I feel as a Federal official has to be said, that a great burden of responsibility by the American Constitution rests with the States, and the cities, and unless they want to abrogate those rights to the Federal Government, they should be preserved. And this present legislation takes that into account, but the point really is we have got to get some order into this, and it extends into all areas of the environment, as well as noise. But your point I think is a very important one, and I made a note on it to remind myself to be sure we include this in the hearings that deal purely with planning. Thank you very much.

Professor **Plager**. Only to echo that, I thought your point about truth in real estate sales practices is also very good.

Mr. **Edwards**. We call it real estate act. We still sell a lot of homes in Elk Grove. My only other point—I am sorry the cameras left—I wore a purple shirt.

Dr. **Meyer**. Thank you very much, sir. As I said, I think you have given us something to carry on. Next we will hear from Mr. John Kerrigan.

STATEMENT OF JOHN KERRIGAN, CITIZENS AGAINST NOISE

Mr. KERRIGAN. Mr. Chairman, panel members, my name is John Kerrigan; I am a member of two citizens groups, the Campaign Against Pollution, and Citizens Against Noise. The reason I am a member of Campaign Against Pollution and Citizens Against Noise is I live in Chicago, on the northwest side, about 4½ to 5 miles east of Runway 27 right, in the area called Norwood Park.

In our community aircraft noise is a 7 day a week, 365 day a year operation. We live, work and play with aircraft noise pollution as our constant companion. From 7 a.m. in the morning until 10 or 11 p.m. at night we are bombarded at regular 1 to 2 minute intervals by a screaming jet plane.

In the words of a tower controller, this runway is heavily used for both takeoffs and landings, approximately 600 a day. We have got the people from Minneapolis beat by quite a bit on one runway. However, in all fairness I must admit we enjoy the luxury of a quiet, relatively quiet evening between 11 p.m. and 7 a.m., which is precisely the reason we are assembled here. We would like to extend the luxury of relative quiet to 24 hours.

Gentlemen, the people of the northwest side are upset about the noise problem, but they are also upset at the apparent lack of activity in dealing with this problem. The city administration, and Congressman Pucinski have told members of the Campaign Against Pollution that they are concerned with the problem of noise around the airport, but that the Federal Government is the only agency that can do anything about this problem.

Yesterday Mr. Poston testified in behalf of the city of Chicago, and let the people of Chicago down. Our official environmental director had no specific recommendations to make to the Federal Government concerning aircraft noise pollution—not only have our local officials failed us, but some of our State officials. The members of the Campaign Against Pollution presented to the Illinois Pollution Control Board for adoption the California ordinance, or noise standards.

Three months have passed since these hearings, and nothing has come from the Illinois Pollution Control Board. People of the northwest side are upset by the apparent inactivity because of the seriousness of the noise problem around O'Hare.

I would like to temper my remarks directed at the State, in view of Mr. Desmond's previous testimony, I wasn't aware they were that active. However, the present city administration, while carrying out its responsibility to the air traveler, has neglected to preserve and protect the rights of the citizens who live here or around the airport.

As airport proprietor they have consistently taken a Pontius Pilate view of airport noise abatement; that is, they have washed their hands of the whole affair, but they must surely recognize the existence of other noise problems as attested by the recent adoption of a recent noise ordinance, but can you imagine the scene of a block full of homeowners receiving summonses for operating a lawn mower too loudly, while overhead a screaming jet obliterates all sound, and continues on its arrogant way?

We in the city would like, and truly hope to receive a more aggressive program in the area of aircraft noise abatement. However, while we feel government in general has been lax in addressing themselves to the problems of aircraft noise abatement, you must admit the airlines themselves are the ones who have failed to act with common decency and moral responsibility.

They have been protected and coddled far too long. Since the advent of the commercial jet in 1959, 12 years ago, relatively little has been done by the airlines to reduce noise. For them, never will be the right time to retrofit and muffle engines. Despite their public relations claims no relief is noticeable. Long range stalling and foot dragging is totally unacceptable to the people who are begging for relief now or in the very near future. We must certainly hope that this agency will be more successful in carrying out noise abatement programs than other Government bodies have been in the past.

Dr. **MEYER**. We are going to give it a try.

Mr. **KERRIGAN**. That is about it, sir.

Dr. **MEYER**. Fine. Thank you very much, sir. I appreciate getting the information.

Mr. **KERRIGAN**. Thank you.

Dr. **MEYER**. We can't guarantee anything, but we are going to try.

Mr. **KERRIGAN**. We appreciate it, sir.

Dr. **MEYER**. Is Mr. Wendell P. Berwick of the Thomas O. Myers Real Estate Organization, Inc., here?

Mr. **BERWICK**. Yes, sir.

Dr. **MEYER**. You are another patient gentleman, and again, we apologize for the length of time.

Mr. **BERWICK**. Yes.

STATEMENT OF WENDELL P. BERWICK

Mr. **BERWICK**. I think the location is important, it's 491 North York in Elmhurst, and we sell in all of Du Page County. When the Morrison Hotel was on Madison Street you could talk to your companion as you walked along the street. Now the First National Bank scoops up the noise and shoots it down on the street. You have to shout to your companion if you are talking as you go along the street, and you give it up. Apparently the Chicago planners are making mistakes. It appears that there is an increasing use of the airport.

If you sit in your backyard in Elmhurst, 7 miles south of the airport, you hear the airplanes all the time. They are like thunder. When you think one has passed, there is an extra reverberation, then the next one comes. Only those who can afford extra insulation and central air-conditioning can really enjoy the summer.

Recognizing that we have plundered our planet with little regard for the future, 11 of us from the nation formed a pollution conference for the Methodist Board of Christian and Social Concerns in Washington in 1961. Yet 10 years later many still do not care, when dollars are involved, whether there will be enough water for their grandchildren, or whether the air contains lead.

To give you some personal experiences, a week ago I had a referral of a buyer of a $50,000 home who was told by a pilot that Elmhurst is in the pattern, and really we hadn't thought of ourselves as that way. I said, "You must mean Elk Grove," and I showed him a $53,000 home in Elmhurst. However, when he came out of the house, zoom, roar and thunder, and we could not converse. Needless to say, this referral did not, believe me, did not buy in Elmhurst, and will not come back. That person believes we have an air and sound pollution in Elmhurst.

Again I was showing a trilevel there, and when we came out of the home, zoom, zoom, two planes, and the odor of the planes was thrown down at us by the wind. This does not always happen in Elmhurst, in the northern part of Elmhurst it often happens; just about all the time in Wood Dale and you heard one of their men speak.

These people bought farther west. We recently sold a 22-year-old home in Wood Dale that was listed with us under a flight pattern, for a mere $36,000, that would easily—that home would easily have brought $46,000 if there were no planes overhead, so low you could identify them. The owner of this home lost the $10,000.

I personally have a sonic boom crack in my home. It took four evenings to repair. All of us are afflicted with this, and if you have any connection with those airlines, whenever I fly them, my ears hurt a week later. I would rather go a little slower and not so high, and get there a little slower than suffer with my ears.

If this noise level continues to increase, property values in Elmhurst, an ideal community with a college, hospital and YMCA will go down. My contribution to the hearing is to let you know that this noise problem is spreading 7 miles south of the O'Hare Airport. Thank you.

Dr. MEYER. I appreciate very much getting those dollar figures. I wonder if you might, for the record—and I don't need to know, you know, specific addresses, because that might be embarrassing —but I would like some information on some similar information of that sort that you might have of property values that have been affected. It would be very useful to us.

Mr. BERWICK. I could send you a copy of the listing, and probably some comparables of what it could have brought, such as built 22 years ago, brick home, et cetera.

Dr. MEYER. I would like to have that. That would be very useful to us; that kind of data is very hard to come by, and your coming forward with it would be very useful.

Professor PLAGER. Can I ask a couple of quick questions, as long as we are all here, we may as well maximize our opportunity.

Dr. MEYER. Go ahead.

Professor PLAGER. You are a real estate——

Mr. BERWICK. Broker, salesman with Thomas O. Myers.

Professor PLAGER. Fine. Are you a member of the Illinois Board of—what is it?

Mr. BERWICK. Illinois Association of Real Estate Boards; our organization is.

Professor PLAGER. Your organization is?

Mr. BERWICK. Yes.

Professor PLAGER. What is your reaction, as a realtor, to the suggestion made by one of the immediately preceding speakers here for having some sort of a truth in real estate transaction law, or a disclosure provision; what is your personal reaction?

Mr. BERWICK. I didn't know just what he meant, because we certainly are regulated by law in the State, so that the truth has to be stated in advertising, so I——

Professor **Plager**. I think what he has in mind, or I take it what he has in mind is a provision similar to the present requirement for violations of housing codes, for example an affirmative statement included in the land sale contract that this house is subject to certain kinds of noise levels, or something like that.

Mr. **Berwick**. Oh, I see what you mean. Well, they are very obvious when you show the home. One lady would tell me, "It just seems uncanny that every time one of you men call, that the home is going to be shown for 2 or 3 days, I can't hear myself think, they just zoom."

She, for a few years, her house was for sale. Evidently the pattern has changed some, but the people realize that, and what my concern is that it is affecting my pocketbook. I am losing sales that I never imagined I would be losing over this noise. It is getting louder and more frequent.

Professor **Plager**. But from the viewpoint of insuring that prospective buyers and realtors who are engaged in the business are fully informed, what would be your reaction to a requirement, a State law, what have you, Federal law, whatever——

Mr. **Berwick**. You mean if a man moves here from Connecticut to buy a home he should be forewarned there is such a decibel reading in that home? Yes, I would not have bought in Elmhurst when I came from Connecticut 8 years ago with the noise level was what it is today.

Professor **Plager**. As a member of the real estate profession, would you support a legal requirement that there be that kind of affirmative disclosure in real estate contracts?

Mr. **Berwick**. I would really have to sell someplace else, because now Elmhurst is a lovely town, has a great deal to offer, but I am afraid the noise level has increased. I, myself, would not have moved there 8 years ago, and I am hoping you fellows prevent the expansion of this. I couldn't tell what the Illinois task force hopes to do on this because I guess they are still formulating an opinion on it, but I am against expansion, as these aldermen and mayors are.

Professor **Plager**. What would you predict would be the view of the Illinois board, the Illinois Association of Real Estate Boards on a mandatory disclosure requirement in areas subject to noise from aircraft operations? Would you care to comment on that?

Mr. **Berwick**. It would really hurt the homeowners in the area, like under the flight pattern in Wood Dale, in some sections of Bensenville—Mayor Varble could tell you it would really, if the Government were going to subsidize them, like I heard they did for sonic booms, that might be fine, but I would hate to hurt those people more than they are, because they are taking a loss, they are taking a beating.

For example, this particular woman whose house I must have shown two dozen times, because I felt it was a good value, even despite that, took a loss. I would say her house was sold for $4,000 less and took 2 years to sell.

Dr. **Whitcomb**. Aren't you saying what would be bad for one group of people?

Mr. **Berwick**. The homeowners would suffer.

Dr. **Whitcomb**. The buyers would find it very bad, so you can't do it, really in good conscience?

Mr. **BERWICK.** Now, I had attended this pollution conference in Washington in the early sixties, so I elected to move straight west of Elmhurst to escape Gary, and 7 miles south of the airport to escape the fumes. I understand one jet airplane equals 3,000 automobiles, so I thought I was making a good choice ecologically 8 years ago, but now this airport has expanded a great deal, so I came down here to let you know that it is affecting us in Elmhurst.

Professor **PLAGER.** Thank you.

Mr. **BERWICK.** Thank you.

Dr. **MEYER.** Thank you very much. Is Mr. Vernon Lindahl here? Mr. Lindahl?

(No response.)

Dr. **MEYER.** We have two statements that we will put in the record, one from Congressman Mikva and the other from Alderman Despres.

STATEMENT OF CONGRESSMAN ABNER J. MIKVA, SECOND DISTRICT, ILLINOIS BEFORE THE U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION IV, HEARINGS ON NOISE POLLUTION, CHICAGO, ILL., JULY 29, 1971.

Congressman **MIKVA.** In one way or another, all of us are here to make some noise about noise. Peace and quiet have become such rare and precious commodities in this country that their pursuit is now a Federal case. Noise has made them rare commodities, noise—incessant or occasional, in the factory or in the home.

It is almost impossible to escape it in urban America. Very few people have developed an immunity to it. Noise is one thing that is almost everywhere—the United States is immersed in what one expert called "acoustic anarchy." That term is rather apt. Almost anything that "works" in this technological society of ours makes noise: vacuum cleaners, snowmobiles, jet planes, lawnmowers, trucks, the elevated trains, motorcycles, sirens. We even talk louder than we have to.

And I have been told that some rock bands have a stipulation in their contracts that they can perform above a minimum sound level. On the decibel scale, that level happens to be a bit louder than a jet plane.

Noise is no longer a nuisance—no longer something that gets on old people's nerves—noise is now a public health problem of significant proportions. The World Health Organization studied the problem recently. It concluded that, in terms of accidents, absenteeism, inefficiency and compensation claims, industrial noise alone costs $4 billion a year. Noise can make the blood vessels constrict, dilate the pupils, and it is a major cause of nervous stress. And it goes without saying that noise makes people lose their hearing.

Noise is environmental pollution of the first order. But because it is so pervasive, the problem is not as dramatic as black smoke billowing from a plant—or raw sewage streaming into a river. One of my colleagues in Congress has called noise pollution the stepchild of the environmental movement. That has been true—at least until now—but difficult to understand. You can turn your back and not see the smoke billowing from a factory or the sewage in the river—but the noise: you can't turn your back on it. And noise pollution is no less harmful, no less menacing than other kinds of pollution.

The right to a quiet, peaceful environment—free from the intrusion of unwanted and harmful noise, is as basic as the right to clean air, clean water and pure food. We reached a point several years ago with air and water pollution where we simply said "enough," and we began demanding legislation to clean up the air and the water. I hope we finally are reaching that same point with noise pollution. The only alternative is to resign ourselves to living in what amounts to a coast-to-coast boiler factory.

Urban noise has doubled since 1955—it may double again by 1980. Perhaps as many as 20 million people in this country have some kind of hearing impairment—primarily because of excess noise. Perhaps as many as 16 million workers labor under conditions unsafe for hearing. Current laws do not really protect citizens from the dangers of excess noise. The Environmental Protection Agency has taken some steps in the right direction. Hearings like this one call attention to the problem. But more legislation is needed.

Congress has the responsibility here. And I would like to take a few minutes to tell you what we are trying to do about it. This session, I cosponsored a package of four bills designed to combat the noise pollution crisis in the United States. I will explain each one briefly.

The first is the Office of Noise Abatement and Control Appropriations Bill (H.R. 6985). In 1970, amendments to the Clean Air Act authorized $30 million for such a noise control office, but the administration has refused to request the money. This fiscal year, for example, only $300,000 were allocated. This new bill will guarantee the complete use of the funds for the control office.

Next is the Noise Abatement and Control Act of 1971 (H.R. 6987). The appropriations bill gives the noise abatement and control office the money—this act gives the office the power and the responsibility to attack noise pollution directly. It directs the office to set standards for all machinery making noise that may endanger the public health, and it gives the office the power to enforce those standards. The act also makes it possible for the Federal Government to help local governments combat the noise problem at their own level.

The Occupational Noise Control Act of 1971 (H.R. 6991) is the third part of the package. Prolonged exposure to noise levels above 85 decibels can result in permanent hearing damage. Yet, under the present standards, 90 decibels is the limit for normal factory operation. This act would change that. It requires the Secretary of Labor to set standards reducing the noise level by 10 decibels—that means that the noise is cut in half. The noise pollution bill offered by the Nixon administration is weaker than this. It is not as inclusive—it is not as forceful—it does not allow for stricter standards at the local levels of government.

The fourth and last section is the Noise Disclosure Act (H.R. 6989). One of the prime reasons that noise has increased so much over the last few decades is that the consumer has been unable to get reliable information on product noise. This bill would require all new mechanical and electrical equipment, with but a few exceptions, to carry a label indicating its operational noise level. The consumer can then take the noise level into account before he buys something. That would be an incentive for the manufacturer to come up with a "quieter" product. I am placing a copy of the four bills in the record of this hearing.

These bills will not become law—the cities will not get any quieter—until we bring more pressure to bear on public officials—until we make the public more aware of the health problem that excessive noise represents. We have been studying noise in this country for some time now. People in Europe have been concerned about it for even longer. History tells us that there was a public outcry over excessive bellowing and quacking in the public markets of England—in 1800. And Queen Elizabeth I was supposed to have considered passing a law that prevented a husband from beating his wife after 10 o'clock at night. The wailing and crying disturbed the neighbors. We have been disturbed long enough, too.

We have studied noise pollution—we have been concerned about it—we know it is a major public health hazard. Now, all we have to do is to do something about it. Thank you.

STATEMENT OF LEON M. DESPRES, ALDERMAN, CITY OF CHICAGO

Mr. **Despres.** Two of the worst noise polluters in the Chicago area still operate almost free of noise regulations. And so far no one in city or State government appears committed to tackling them. I refer to Chicago's airports and the Chicago Transit Authority. The constitutents I represent suffer acutely from the noise pollution of both of them. On both of them we need Federal help.

The Federal Government's power to act against noise emissions from the airports is direct and clear. Its power to act against the CTA is indirect but decisive, through Federal grants for urban transportation.

Three Chicago airports are within the city limits. O'Hare directly affects 2 million people. Midway, which the city wants to continue to reactivate, may simply take part of the problem away from O'Hare, but still keep it in the city. Meigs is on the lakefront.

In the Chicago noise ordinance, the mayor and the city council squarely avoided the airport issue. Although I believe the city has considerable power to act on airport noise, the city law department said that the city lacks such power. Consequently the ordinance was silent on airports, but unfortunately the airports are not silent. Since the city has not acted, the Federal Government should act quickly; and it should act because scattered disparate noise regulation by municipal bodies cannot solve the aircraft noise problem. Airlines attempting to meet varying standards across the country may end by meeting none. It is high time that comprehensive, uniform, adequate Federal noise pollution standards be adopted for airports.

Of similar proportions is the noise from Chicago's rapid transit lines. In responding to the CTA noise problem, the Chicago city government has chosen to talk with the CTA rather than govern its operations by ordinance.

Some experts say that CTA rapid transit train noise levels are high enough to induce some hearing damage. I agree with them. A commuter who uses the rapid transit system five to 10 times weekly over a period of years is likely to experience hearing loss. Precise measurements have recorded regular sound levels of

105 decibels on the A scale at 45 feet from the track's center. The average noise level seems to fluctuate between 90 and 100 decibels. As the subway trains screech around curves, the noise is worse. CTA spokesmen have said they can reduce noise somewhat, but lack the necessary equipment and money to do an adequate job.

The Federal Government's direct authority to regulate CTA noise is uncertain; but, it does have a powerful weapon in the local transportation grants CTA must have to survive. Under the 1969 "National Environmental Policy Act," major Government-financed construction must be planned to produce minimal impact on the environment. Since Chicago requires heavy Federal capitalization to construct the Central Subway and outlying distributor systems, Federal noise criteria for public transportation would require Chicago to meet the criteria, or lose Federal funds.

We need your help to reduce noise. We ask your help. We hope you hear us.

Dr. **Meyer.** That concludes our schedule of witnesses, and I thank everybody who has been here. I have found this to be a very informative and useful session. I hope that we will be able to live up to the expectations and desires of people who have made their views known. This hearing on noise is hereby adjourned.

(Whereupon, at 7:30 p.m., the hearing was adjourned.)

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